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RESULTS OF THE ARCTIC EXPEDITION, 1875-76.*

THE publication of the work of Sir George Nares, containing a record of the results of the Arctic Expedition, is the most important geographical event of this year. It will effect two great objects. It will show the practical value of the Arctic work that has been done, and it will at the same time establish the fact that future exploration within the Arctic Circle is desirable. Those who have advocated a renewal of Arctic exploration by the Government of this country during the last twelve years have always had in view the attainment of scientific results, and that alone. In former days the discovery of a commercial route was the main object of Arctic voyages of discovery, but this notion has long since been abandoned. Another object has been to reach the North Pole, which in itself is a childish and useless quest, and quite unworthy of serious consideration, although it was unfortunately foisted into the Admiralty Instructions. They might as well have inserted orders to go to the moon. But to add to the sum of human knowledge, to learn respecting unknown regions all that we already know of Greenland or the Parry Islands, is a great and important object well worthy of attainment, and of all the dangers, hardships, and expense which must be entailed in securing it. It was to obtain this object that the late Admiral Sherard Osborn worked so perseveringly and successfully, and for which the late Arctic Expedition was despatched. The great aim of those who advocated further polar exploration, and whose representations led to the expedition being sent out, was to secure the discovery and exhaustive exploration of the largest area of unknown region that could be reached by the explorers with the means at their disposal.

The first point to decide was the route by which this object could best be secured; and the only sure guide for arriving at a right conclusion was the accumulated experience of three centuries of previous Arctic exploration. The first great lesson taught by those three centuries of experience is that no extensive and useful exploring work can be done by merely entering the drifting pack ice in a ship, and that effective progress can only be made by following a coast-line. The second Arctic canon is, that to secure useful scientific results, observations must extend at least over a complete year, and that consequently one winter must be faced in a position beyond any point hitherto reached. The third canon is, that mere navigation in a ship cannot secure the results derived from Arctic exploration, and that navigation must be supplemented by sledge travelling. The exploration of 50 miles of coast by a sledge party is worth more to science than the discovery of 500 miles of sea or coast by a ship. In the former case, the land is accurately mapped, and its fauna, flora, geology, and physical features are ascertained. In the latter, a coast is seen, and its outline shown by a dotted line on a chart, and that is all. The two methods will not bear comparison.

The experience of centuries of Arctic research has thus resulted in the establishment of three canons, which form unerring guides to us who inherit that experience. The first is to navigate along a coast line and avoid the drifting pack. The second is to winter at a point beyond any hitherto reached. The third is that a ship must only be looked upon as a base of operations, and that sledges are the main instruments for discovery and exploration.

With these rules as a sure guide, the best route for an Arctic Expedition had to be decided. The question was—by which route leading to the unknown polar region, could these essential conditions best be found. In the first place there must be coast lines leading into the unknown space, both for navigation and for sledge travelling. In the second place there must be a fair prospect of securing winter quarters beyond the threshold of the hitherto discovered region. In the third place there must be unknown coast lines extending beyond the winter quarters.

In 1875 Smith Sound, at the north end of Baffin's Bay, and the east coast of Greenland alone met such conditions. Of these two routes, Smith Sound offered two coast lines for examination instead of one, and its navigation was reported to be less precarious up to the furthest point hitherto reached. The Smith Sound route was consequently the best by which to recommence the discovery of the vast unknown area.

This was the train of reasoning, very briefly stated, by which we arrived at the conclusion that to secure the true objects of Arctic discovery, and to make a successful commencement of the examination of the unknown area, the first expedition should proceed by the route of Smith Sound.

* *Narrative of a Voyage to the Polar Sea during* 1875-76, *in H.M. Ships 'Alert' and 'Discovery.'* By Captain Sir G. Nares, R.N., K.C.B., F.R.S., Commander of the Expedition. With Notes on the Natural History, edited by H. W. Feilden, F.R.G.S., Naturalist of the Expedition. Two Vols. (Sampson Low; 1878.)

The true object of the late Arctic Expedition was then to penetrate up the channels leading north of Smith Sound, to cross the threshold of the unknown region, and to winter at a point beyond any that had previously been reached, and by sledge travelling in various directions to secure those rich scientific results which the examination of an unknown region invariably yields; to the utmost possible extent, with the means at their disposal.

This was a most difficult task. The late explorers have performed it, and they have thus achieved a great and memorable success. And this leads us to the consideration of the true test of the success of an Arctic Expedition. It must be borne in mind that unless a new expedition excells all that have gone before in the same direction it cannot succeed. The first and only condition of success is that an expedition should cross the threshold of the unknown region; and, when it is remembered that this cannot be done unless the furthest points attained in the course of former efforts are not only reached but passed, it will be seen that this in itself is no slight achievement.

A successful Arctic Expedition is, then, one which has crossed the threshold of the unknown region and entered upon new ground. The extent and amount of that success must be measured first by the nature of the difficulties and dangers which were encountered and overcome, and secondly by the variety and importance of the results that have been secured.

The expedition, commanded by Sir George Nares, and consisting of the two ships 'Alert' and 'Discovery,' answers to the first essential test. The leading ship crossed the threshold of the unknown region, and the British flag was hoisted in a latitude where no flag of any nation had ever been hoisted before. It also wintered at a point beyond any hitherto reached. The expedition was therefore successful. We would now invite the attention of our readers to the difficulties that were encountered and overcome, and to the scientific results that were secured, in order that a correct judgment may be formed of the amount of success achieved, and of the value of the results. Upon these considerations depends the cogency of the arguments by which the continuance and completion of Arctic research can be advocated.

The first point for our consideration is the preliminary work of the expedition by which it reached the remote point in the previously unknown region which secured success; in other words—the ice navigation. In passing through Baffin's Bay the same difficulties were overcome, neither more nor less, as are encountered every year by the hardy and intrepid whalers from Dundee, and as were met with by previous Arctic Expeditions which have proceeded up Barrow's Strait, Wellington Channel, or Regent's Inlet. But after entering Smith Sound a far different and far more formidable navigation commenced. The navigation of the channels leading north from Smith Sound is the most difficult of any that has been experienced in Arctic coast waters.

During the whole of August, 1875, the 'Alert' and 'Discovery' were engaged in one long incessant struggle with the ice. Every opening was taken advantage of, and, thanks to combined judgment, skilful seamanship, prudence, and daring, they slowly but surely made progress northwards.

The ice in Robeson Channel and the Polar Sea beyond is entirely different from any ice that has ever been seen before, except along the west shores of Banks and Prince Patrick Islands. Scoresby and other Arctic voyagers have mentioned having encountered ice of great thickness, but it has been formed by one floe sliding underneath another; and lines of ice hummocks have also been met with of great height, formed by broken pieces piled one upon another. There is nothing of this kind in the sea of ancient ice. The floes, from 80 to 100 feet thick, are formed by the accumulated frosts of ages, and are solid masses. They are, in fact, floating glaciers rather than ice floes; and the pieces broken off from them and forced on the shore, were very appropriately named "*floe-bergs*." Some of these huge masses were 60 feet above the water, yet they were aground in 10 or 12 fathoms.

On the 1st of September 1875, a S.W. gale blew with such fury that the pack was driven off the land, leaving a narrow channel of water, of which advantage was instantly taken. This was a red letter day in the annals of naval enterprise. On it a British man-of-war reached a higher northern latitude than had ever been attained by any ship of any nation; and the colours were hoisted at noon to celebrate the event. But one short hour after the British ensign had fluttered gaily before the breeze, the ship was again stopped by a barrier of great thickness, through which it was impossible to penetrate. The coast was without any bay or harbour, and the 'Alert' was secured inside a fringe of grounded floe-bergs which lined the coast, and afforded protection from the pressure of the outside pack.

Success was thus made certain. The threshold of the unknown region was crossed. To have brought a ship through all these dangers, and to have found winter quarters on the open and exposed coast of the Polar Sea, protected only by grounded floe-bergs, which might at any time be driven higher up or swept away, was in itself a great success. No other Arctic navigator ever forced his ships through such obstacles, and brought them safely back again. This establishment of a base of operations within the unknown region called forth all the highest qualities of a commander—incessant watchfulness, great presence of mind, rapid yet cautious decision, and consummate seamanship.

The next service to be performed was the laying out of depôts of provisions by autumn sledging parties. Autumn travelling, in the Arctic Regions, is most severe and miserable work, entailing the greatest amount of hardship and danger. It was first attempted in the expedition in which we had the honour to serve in 1850, and it was further developed in 1852, at Melville Island, when McClintock and others were away for 22 days in October, with the temperature generally above zero. The parties from the 'Alert' were away during September and October in blinding snow-storms, on treacherously thin ice, exposed to sudden changes of temperature, with increasing darkness. But they pressed onwards, and established a depôt 50 miles from the ship, for use during the spring. The temperature fell far below zero, and the sun had entirely disappeared four days before they returned to the ship. In comparing the autumn travelling of the 'Alert' with that of former ex-

peditions, the difference of latitude must be taken into consideration. The sun did not leave the points where most former expeditions have wintered until the 3rd of November; while it was last seen from the 'Alert' on the 11th of October. This makes a vast difference. The cold and darkness experienced by the 'Alert's' parties in October are equivalent to what a party from any former expedition would have had in November, and no party ever travelled in that month. Hence the autumn travelling of the 'Alert' has eclipsed all that had ever been done previously, whether we consider the work accomplished, the hardships endured, or the cold and misery experienced. Unfortunately, this brilliant piece of work had to be heavily paid for. Half the men returned badly frost-bitten, and three suffered amputation, including one of the most valuable officers in the ship.

An Arctic winter is a period of preparation for spring travelling. The great point is to preserve the health of the men under the most disadvantageous circumstances. The precedents of former expeditions were carefully followed. The officers were fully employed with scientific work, and the men were kept constantly amused and interested by schools, lectures, theatricals, and other entertainments. Special care was taken that the men took daily exercise, and lime-juice was not only regularly issued, but all the men were obliged to drink the daily allowance in presence of an officer. In this respect the expedition of 1875-76 made a considerable addition to the usual precautions against scurvy. For instance, in the expedition in which we served, and in most others, the lime-juice was merely served out to the messes and the men drank it or not, in their own messes, as they pleased. But in the 'Alert' and 'Discovery' special and unusual care was taken that every soul on board actually drank his daily allowance of lime-juice, and that the full amount of daily exercise was taken. We dwell particularly upon these facts because, with reference to the terrible outbreak of disease in the spring, there has been much very disgraceful misrepresentation. The true cause of scurvy is the absence of fresh food with such predisposing causes added as long darkness, foul air, intense cold, and damp. All expeditions have been exposed to these influences. The sole difference is that the men of the late expedition were exposed to them for a much longer time than any other. The sun was absent for 142 days, instead of 94 days. In the case of former expeditions which sent out sledging parties for long periods there was never total darkness at noon. In the 'Alert' there was greater darkness during the whole time from November 6th to February 5th than there was on the darkest day with former expeditions. It was this difference which caused the outbreak of scurvy. But it could not be foreseen. Apparently the long darkness was passed through without deterioration, and when the sun returned every soul seemed to be full of life and energy; and all undoubtedly were influenced by the determination to do all that resolute men could do, and to achieve the most complete measure of success that was possible with the means at their disposal.

The crowning work of an Arctic Expedition must always be achieved by means of sledge travelling in the spring. By this method alone can an unknown Arctic coast line be satisfactorily and exhaustively explored. The system of Arctic sledge travelling was adopted in the searches for Sir John Franklin, and was elaborated and perfected by Sir Leopold McClintock. All the details of equipment, and the scale of diet for the travelling parties of the late expedition were in exact accordance with the results of McClintock's long experience; based on the numerous extended journeys over the ice, which were made by that highest of all Arctic authorities and his comrades who served with him in the search expeditions.

The details were studied and elaborated with great care by the officers of the 'Alert' and 'Discovery,' and the following slight alterations were made. There was a reduction in the weights to be dragged on first leaving the ship, as compared with those adopted by McClintock in 1853, and a very considerable reduction when compared with Sir Edward Parry's weights in 1827. A reduction was also made in the allowance of rum, and an increase in the allowance of tea; and tea was substituted for rum for the midnight meal. Lime-juice had never been given as a daily ration to sledge travellers in any previous expedition, except in the case of Sir James Ross, in 1849, whose party suffered from scurvy. But special care was taken in this respect by Sir George Nares, and all sledges which were sent away after the thaw, when it became possible to use it, were supplied with regular rations of lime-juice. In all other respects the equipment and scale of diet of the late expedition's travelling parties were identical with those adopted by McClintock and other old Arctic officers, and which long experience had proved to be best.

Lime-juice was not sent with the sledges during March, April, and May, for the very sufficient reason that it could not have been used in those months, in the form in which it was supplied to the expedition, namely liquid, in bottles and jars. During the intense cold of those months, a bottle or jar placed near a fire would at once be cracked into pieces. Sir George Nares would, therefore, have acted wrongly if he had added largely to the weights by loading the sledges with lime-juice jars or bottles, knowing perfectly well, as all Arctic travellers know, that, in that form, it could not be used during intense cold. He, however, placed lime-juice in the depôts, to be picked up during the return marches after the thaw had set in.

If lime-juice would have prevented the outbreak of scurvy in the travelling parties, as has since been alleged, there was gross neglect among those who were responsible in this country, for not having supplied the anti-scorbutic in a form in which it would have been possible to have used it during intense cold. It has since been found that it might have been supplied in lozenges or in the pemmican. But there was no neglect of any kind on the part of Sir George Nares, who did all that close study of the subject, careful forethought, and former Arctic experience could suggest to secure the health and comfort of the men while employed on this hazardous and most severe service. It is now certain that the long winter was the real cause of the outbreak of scurvy, and that the subsequent use of lime-juice would not have averted it. The moment lime-juice could be used, it was supplied to the sledge parties; yet, in nine instances, men were attacked with scurvy

in those later parties, as well as on board, who were taking daily allowances of the anti-scorbutic. This fact is quite conclusive on that point.

So much misrepresentation has been published on this subject, that we have considered it necessary to re-state the above facts. It is a very disgraceful and discreditable thing to reflect upon, that our greatest explorers and travellers, by sea and land, from the time of James Bruce of Kinnaird, have been attacked on their return by a swarm of ignorant detractors. Certainly none have deserved such treatment less than Sir George Nares, and the officers and men who had the honour of serving under him; for none ever worked harder, and with more single-minded zeal, to deserve well of their country.

Having placed his ships in admirable positions, Captain Nares organised his spring travelling parties with a view to making as thorough an exploration as the means at his disposal allowed in every direction. He decided upon despatching four extended parties provisioned, including depôts, for periods of from sixty to eighty days, to advance as far as possible north, south, east and west. The most hazardous attempt was to be made due north over the frozen sea under the command of Captain Markham, and, as there was danger that the ice near the coast might break up, this party was obliged to drag boats with it. Aldrich led the extending party along the coast to the westward, Beaumont of the 'Discovery' was to push along the north side of Greenland to the eastward, while Archer advanced southwards down the deep fiord at the entrance of which the 'Discovery' wintered, which was then supposed to be a strait.

Before the extending parties started it was necessary to open communication between the two ships, and Lieutenants Egerton and Rawson, with Petersen, the Danish dog driver, were despatched from the 'Alert' on the 12th of March, with the temperature at −35 to −50 below zero. The poor Dane was badly frost-bitten, and afterwards nothing could keep him warm. The two officers made a hole in the snow, covering the opening with the tent and sledge. They then deprived themselves of their own warm clothing, and at the expense of the heat from their own bodies, they succeeded, after great persistence and often reiterated efforts, in restoring circulation to Petersen. During the journey back to the ship they behaved most heroically and, though frequently badly frost-bitten themselves, they succeeded in keeping life in their comrade until they arrived on board. They saved his life at the imminent risk of their own. On March 20th they again started and reached the 'Discovery.'

These remarkable journeys of Egerton and Rawson take rank with anything of the kind that has ever been done by their predecessors in Arctic travelling, and the gallant young officers nobly upheld the credit of the expedition by their conduct on this occasion. We look upon the performance of such deeds, which will be handed down to our children, as examples for their imitation, as not the least valuable among the results obtained from Arctic exploration. The record of acts of self-denial in the face of danger done by our countrymen are certainly not less precious than scientific discoveries.

But the great work, for which the autumn and very early spring journeys were only preparatory, was that of the extended parties which started from the 'Alert' on the 3rd of April with the thermometer at −33. In former expeditions the temperature has been equally low for a week or so during the April travelling, but the same amount of continuous cold in April and May has never before been faced.

In all, 53 officers and men left the ship to face the hardships of this intense cold out of a complement of 66. The temperature fell to −45 a few days after leaving the ship, and until the 28th of April it never was up as high as zero. The work before the northern party, owing to the necessity for taking boats, was tremendous. Their only mode of advancing was by a system of double banking, which, with three sledges, meant one mile made good for every five miles marched. Yet there was no alternative, for the impossibility of depending upon depôts laid out on a frozen sea which might break up, and the necessity for taking boats, made any reduction impossible.

The character of the ice to be travelled over was without precedent as regards the difficulties it presented. For no one ever before attempted to traverse the sea of ancient ice. It consisted of very small and rugged floes, separated by ranges of ice hummocks from 30 to 50 ft. high, and sometimes a quarter of a mile wide. The hummock ridges were composed of a vast collection of *débris* of the previous summer's broken-up pack ice, which had been refrozen during the winter into one chaotic rugged mass of angular blocks of every possible shape. The intermediate floes of ancient ice were very rugged and heavy for travelling, and never as much as a mile wide. Their surfaces were thickly studded over with rounded, blue-topped ice humps 10 to 20 ft. high, the depressions between them being filled with snow deeply scored into ridges by the wind. The whole formed the roughest line of way imaginable. At first there was a faint hope that such broken masses were confined to the vicinity of the coast, and that further out to sea the ice would be smoother. But this proved not to be the case, and the whole polar ocean in this part is of the same character.

Over such ice the northern division had to fight its desperate way, going five times over the same ground, and while working 10 and 12 hours a day, and walking over at least a dozen miles, only making at most 2 miles good. It is impossible to conceive more disheartening work, nor work that could more fully try the highest qualities of the men. No excitement, no rest, no change; but continuous and intensely hard work, with scarcely any progress, accompanied by hardships and privations of no ordinary kind. Supported by a sense of duty, by that devoted courage and confidence in their officers which makes seamen of the British navy follow withersoever they are led, these gallant fellows struggled on until they dropped. Not a single murmur or complaint was heard throughout the journey, which, for the difficulties encountered and overcome, is without a parallel in the whole annals of Arctic sledge travelling.

On the 16th of April the fatal disease made its appearance, which so enhanced the difficulties of this memorable journey. One of the men broke down, and had to be put on the sledge. This was equivalent to losing two men, for while his dragging power was lost, his weight was added to what the others had to drag. Still they zealously and cheerfully pushed on, resolved to march northwards to the utmost limits of

their endurance. Two days afterwards a second man broke down with scurvy; and all were becoming much weaker. Yet they lost no particle of their pluck and determination to work onwards until they dropped. By the 6th of May there were three men helpless on the sledges, the rest suffering from great stiffness and pains in the legs.

At length, on the 10th of May, the most northerly camp was pitched, and on the 12th Captain Markham hoisted the British flag in 83° 20′ 26″, the most northern point ever reached by man. Next day they were homeward bound. Never, in the whole annals of Arctic prowess, full as they are of deeds of gallantry and devotion, had men persevered so long, and with such desperate tenacity, actuated solely by duty and by the desire to uphold the honour of their country.

The return march showed how fearfully close they had gone to the limit of safety. Very soon, two more men were attacked, and on the 27th of May, Captain Markham resolved to abandon the boat. It was a hazardous alternative. If they continued to drag this additional weight while becoming weaker every day, they might never reach the land; while there was a probability of finding a lane of water, between the ice and the shore, which would be impassable without a boat. Several of the men, who still tried to drag, were in great pain, but they held out most pluckily, sticking to the drag-ropes until they could stand no longer. Day by day they got worse. On the 30th Captain Markham's sledge was dragged by three men and himself, entailing labour which would soon have overpowered them. At length they reached the land, and Lieutenant Parr was despatched to the ship for succour. They were saved, but help came too late for one poor fellow, who sank to his last rest the day before assistance arrived. Of all that zealous company of strong and brave men who left the ship on April 3rd, only four could do work when they returned on June 14th, after an absence of 72 days. The sledge was dragged alongside the ship by Captain Markham himself and three men.

Aldrich's party to the westward also suffered, but not so severely, and they returned after having discovered three hundred miles of new coast-line.

It must have been a heart-rending sight to see those gallant fellows returning prostrate with disease. Yet, at the same time, it was a soul-stirring and glorious sight. For those men had performed an act of heroism which has seldom had a parallel. In spite of a wasting disease, they had remained resolute and undaunted, and had struggled on to complete the duty on which they were employed, in the face of dangers and hardships at which men in full health might well quail. Warm and hearty was the reception from their comrades in the 'Alert'—a reception which thus found expression in words:—

> "Welcome home to the wished-for rest,
> Travellers to north and travellers to west;
> Welcome back from bristling floe,
> Frowning cliff, and quaking snow;
> Nobly, bravely the work was done;
> Inch by inch was the hard fight won.
> Now the toilsome march is o'er,
> Welcome home to our tranquil shore.
> Rough and rude is the feast we bring;
> Rougher and ruder the verse we sing.
> Not rough, not rude, are the thoughts that rise
> To choke our voices and dim our eyes,
> As we call to mind that joyous sight
> On an April morning cold and bright,
> When a chosen band stepped boldly forth
> To the unknown west and the unknown north:
> And we from our Haven could only pray—
> 'God send them strength for each weary day.'"

The parties from the 'Discovery,' especially that which made important discoveries on the north shores of Greenland, also suffered terribly from scurvy. This outbreak was the one single calamity in an otherwise successful expedition. Every precaution was taken to check its progress, and as soon as fresh meat was obtained in the summer, the men rapidly recovered, and there was not a soul on the sick list when the ships arrived at Portsmouth. The outbreak of scurvy was not an unmixed evil. It has taught lessons which will be of great use hereafter, when the next expedition is fitted out. Nor should the examples of devotion to duty called forth by the terrible sufferings of the sledge-travellers be overlooked. They have added to the prestige of our navy, and will have an enduring value.

The work was not confined to the extended parties. From March to August 1876 every soul in the expedition was actively engaged in furthering its objects—some in laying out depôts and bringing succour to those engaged on the long journeys, others completing the examination of inlets, glaciers, and of other points of interest nearer the ships. The naturalists were away incessantly making collections, and other officers zealously assisted them, especially in the examination of the post-tertiary beds. All did their work admirably, and extended their explorations to the utmost limit—in three sad cases beyond the utmost limit—of human endurance. They fully, completely, and with heroic self-devotion, fulfilled the objects sought by geographers, by exploring that portion of the unknown region accessible by the Smith Sound route, to the farthest extent possible with the means at their disposal.

At the conclusion of the sledging season, in August 1876, Captain Nares was able to review the work that had been accomplished. The outbreak of scurvy had made it imperative to return to England, in order to avoid a certain and serious loss of life. But even if perfect health had been happily maintained, it would have been his duty to return. For the work was done, and done thoroughly. A point had been reached to the westward beyond which exploration would be better conducted by another route. To the eastward a point was attained beyond which further discovery must be achieved by the route on the east coast of Greenland. This part of the Polar Sea was found to be covered with ancient ice, and is not navigable. The work was finished, and it was the duty of Captain Nares to obey the order contained in the 18th paragraph of his Instructions—"to use his best endeavours to rejoin his consort in 1876, and to return to England, provided that the spring exploration had been reasonably successful."

After overcoming even greater difficulties and dangers in the return voyage than had been encountered on the way out, the expedition returned to England in October 1876, and received that cordial and hearty reception which its great success, its valuable scientific results, and the admirable conduct of officers and men had so fully earned for it.

We would now invite our readers to consider the results of the late Arctic Expedition. It will be seen that the wildest and most remote and unknown parts of our earth teem with matters of great interest in every branch of science; and that all the expense, danger and suffering entailed in their discovery and examination are well and abundantly repaid a hundredfold.

Let us first glance at the geographical results. Four hundred miles of previously unknown coast line was discovered; and this, be it remembered, is no barren result. Geography is the base of all other sciences. It supplies the essential element of locality. The accurate delineation of an unknown region is essential for correct description, and to correct deductions in other branches of science, especially in meteorology, geology and biology. So that the new discovery and survey of unknown land was in itself an important result. But still more valuable were the discoveries of the late expedition with reference to the sea of ancient ice.

It was found that the coast lines beyond Robeson Channel trended away to west and north-east, forming the shores of a frozen polar sea, and that along the whole of this distance the ice was of the same character. Its existence was an unexpected and important discovery. The ice is from 80 to 100 ft. in thickness, formed by continual additions from above, due to the annual snowfalls. By the ever-increasing superincumbent weight this is gradually converted into snow-ice. Complete sections of the huge masses forced upon the shore were carefully taken, and they show the way in which the whole is formed as well as its great age. The process of formation of the ancient floes resembles that of glaciers, and the grounded *floe-bergs* had been chipped off from them. The examination of 400 miles of coast line, Captain Markham's journey over the polar sea away from the land, and the minute examination of the sections of *floe-bergs* at the winter quarters have given us a thorough knowledge of this remarkable ice formation; while observations during two summer seasons have thrown light on the amount and direction of the drift which annually takes place. Several considerations point to the conclusion that this sea of ancient ice is of considerable extent. There are no flights of birds to the north, which certainly would be the case if there was land in that direction. Animal vertebrate life ceases to exist on the ice-covered polar sea. The cold currents destroy whales' food, and there are no cetaceans. Except two or three stragglers close in shore no seals were seen, consequently there are no bears. The falcons, which prey on marine life, also entirely cease.

The shore to the westward, after culminating at Cape Columbia, trends away south of west; and it was deduced, from similarity of tides, direction of prevailing winds, and movements of the ice, that this trend continues south-westwards towards Prince Patrick Island. Similar evidence, as regards the drift of the ice and the comparison of winds with those experienced by the German Expedition on the east coast of Greenland, lead to the belief that the north coast, from the furthest point discovered by Commander Beaumont, also trends south to Cape Bismarck. A study of the tides by Professor Haughton confirms this view.

It usually happens that when a new geographical fact is revealed through the labour of scientific explorers, it is found that it harmonizes with other isolated pieces of knowledge which previously stood alone, and were not intelligible without it. Thus the value of discoveries is scarcely ever confined to the work itself; but they throw light upon the true bearings of former work, and help towards the elucidation of far larger questions. As regards the sea of ancient ice discovered by the late Arctic Expedition, this is eminently the case.

Referring to the information gathered by former expeditions, we find that Sir Richard Collinson, in coasting along the Arctic shore of North America, discovered that similar ancient ice composed the pack bounding the narrow lane of water along which he was able to pass in the 'Enterprise' in 1851. He made an attempt to examine this ancient ice from Camden Bay by sledging; but he was stopped on the second day by gigantic uneven floes and lines of hummocks—in short, by obstacles similar to those which were encountered by the northern division of sledges under Captain Markham in 1876. Captain M'Clure found that the same ancient ice extends along the whole western side of Baring Island; and the 'Investigator,' in daily and hourly peril of destruction, passed along between it and the cliffs in 1851. M'Clure describes the surfaces of the floes as resembling rolling hills, some of them a hundred feet from base to summit—aged sea ice, which may be centuries old from the accumulated action of alternate thaws and falls of snow, giving it a peculiar hill and dale appearance. M'Clure emphatically warned those who might meet such ice, that if a vessel got into it she would never be heard of again, and ought not to be followed. Mecham and McClintock found the same ice along the west coast of Prince Patrick Island, and Sir Edward Parry had a glimpse of it in 1819, from the western end of Melville Island.

Standing by itself, as an isolated geographical fact, the heavy ice seen by Collinson, M'Clure, Mecham, and McClintock failed to reveal the whole truth. But the discoveries of the Arctic Expedition of 1875-6 have thrown light upon and explained this interesting question. We now know that the polar sea of ancient ice extends from the shores of North America to the north coast of Greenland, a distance of 1200 miles; for the gap of 400 miles from Prince Patrick Island to the most western point reached by Aldrich in 1876, is a continuation of coast line or islands, as is deduced from coincidences of winds, tide, and drift.

This polar sea is also, in all probability, a comparatively shallow sea. Captain Markham, at a distance of 40 miles from the land, found bottom in only 72 fathoms, and another indication of the present shallowness of this sea is supplied by proofs of the general recent upheaval of the adjacent land. The discoveries of the late expedition enable us to comprehend, with a nearer approach to accuracy, the general relations of the polar area to the rest of the world as regards the circulation of water and the distribution of land and sea. The drift eastward of the ice north of Grant Land seems to be due to the great flow of warmer water into the polar area, which afterwards, as a cold current, seeks an outlet southward at every opening, owing to the polar area itself being surcharged. The warmer water, flowing up between Greenland and Spitzbergen as a submarine

current, appears to come to the surface along the Siberian coast, and, aided by the discharged volume from the rivers, it causes a current round the area from left to right, and also across from the eastern to the western hemisphere. Hence, probably, the tremendous pressure on Grant Land and the north coast of Greenland, which prevents the sea from ever being navigable. It is possible too that the enormous growth of the ice may be due to shoal water or land, which prevents it from floating south with the currents.

The geographical results of the Arctic Expedition are exceedingly valuable, because they have a practical bearing on the general system of oceanic currents and of meteorology, and consequently form an essential part of a vast whole. Without a knowledge of the hydrography of the polar region all the general theories of oceanic currents must be incomplete; and Arctic research is, therefore, essential to a science which is of great practical utility.

But these only form a small fraction of the results of an expedition, from the labours of which every branch of physical science has benefited. We have complete series of elaborate meteorological observations, extending over a whole year, and taken at two different stations. Meteorological observations are taken at the colonies in Danish Greenland, and the distance from the most southerly of these at Ivigtut to the 'Alert's' winter quarters is 1200 miles. Thus, in the memorable years 1875-76, a simultaneous series of observations was taken at both extremities of this widely-extended meridional arc. The results, as might be supposed, were very important. In a former number (Sept. 1877, p. 225) we explained the nature of the Greenland *Föhn*, and the very remarkable example of one which occurred in Greenland from the 20th of November to the 11th of December, 1875. At the same period the weather was similarly disturbed both in 'Discovery' Bay, and at the winter quarters of the 'Alert.' The average temperature at those far northern stations, due to the season, should have been −20 to −27. From November 26th to December 13th the weather remained above the average; and on the 12th the barometer attained the highest level recorded during the year. On the 1st of December the temperature at the 'Alert' rose as high as +35, but not at the 'Discovery,' the very warm blast passing the more southern station without affecting the temperature there. Again on the 4th a southerly squall raised the temperature to +23, and similar phenomena continued until the 14th. It would appear that the disturbance which caused the rise in temperature producing a heat excess of 46° at Upernivik on the 25th of November, arrived at the 'Alert's' winter quarters about twenty-four hours afterwards, causing a heat excess at that extreme northern station of 40°. Captain Nares, at the time, remarked that the gale must have travelled to the northward from the Atlantic, because the warm air was at a higher temperature than any water within many hundred miles of the 'Alert.' This coincidence of the observation of the same remarkable metereological phenomenon in Greenland and in the extreme north serves to show the great value of Arctic research in this branch of scientific inquiry. As regards magnetic observations, two complete and elaborate series were taken by Captain Markham and Lieutenant Giffard in the 'Alert,' and by Lieutenants Archer and Fulford in the 'Discovery.' The tidal observations also yielded important results, which have been worked out by Professor Haughton.

The examination of the geological formation of the whole coast line on the west side of the Smith Sound channels from Cape Isabella to Cape Union, as well as of the shores of the polar sea for 400 miles, and the collection of rocks and fossils at every point, are also results of great importance. Some broad geological facts have thus been established, which dovetail with those derived from an examination of the Parry Islands. Thus the carboniferous limestones of Cape Joseph Henry will, in all probability, prove to be a prolongation of similar beds discovered on Eglinton Island, west of Melville Island, by Mecham and Nares in 1853.

But by far the most important geological discovery was that relating to the existence of tertiary coal in 82° N. latitude, and the former extension of a miocene *flora* to that parallel. A bed of lignite, from 25 to 30 ft. thick was found, resting unconformably on azoic schists. The lignite is overlain by black shales containing many impressions of fossil plants which have been examined by Professor Heer. He reports that remains of 25 species of plants of the miocene period were collected, including two species of *Equisetum*, as many as ten conifers, a *Carex*, and eight dicotyledons—namely, a poplar, two species of birch, an elm, a *Viburnum*, two *Coryli*, and a water lily. *Pinus abies*, which occurs here and in Spitzbergen, did not exist in Europe in miocene times, but had its original home in the extreme north, and thence extended southwards. One tree, *Betula Brongniarti*, had not previously been found within the Arctic zone.

Professor Heer says that this thick lignite bed in 82° N. indicates the former existence of a large peat moss, probably containing a lake in which water lilies grew. On its muddy shores stood the large reeds and sedges, the birches and poplars, and some fir trees. The drier spots and neighbouring chains of hills were probably occupied by pines and firs, associated with elms and hazel bushes. A single elytron of a beetle is at present the sole evidence of the existence of animals in this forest region.

The astonishing discovery of a rich fossil *flora* so near the pole has given rise to much speculation among geologists. Professor Ramsay cannot believe that these trees could live through the long night of an Arctic winter, and flourish again the following summer: and he has suggested that there must have been a change in the direction of the axis of the earth with respect to the sun's light. Dr. Murie, on the other hand, thinks that too much stress has been laid upon the influence of the sun's light, and suggests that changes in electrical conditions might have some influence on the possibility of the existence of life at the poles. Other authorities believe that it is not the geographical position of the poles, but the climatic conditions of the polar regions which have undergone a change. Be this how it may, the discovery of a fossil *flora* so near the pole is a most important result of the late expedition, and one which, like all others, points to the desirability of continuing and completing north polar researches.

Scarcely less important are the zoological and botanical results of the expedition.

To begin with ethnology, the interesting inquiries with reference to the migrations of Eskimo tribes and their history, have had fresh light thrown upon them. Traces of Eskimo encampments were found at intervals on the western shores of the channels leading from Smith Sound; and under Cape Beechey, about 6 miles south of the 82nd parallel, Captain Feilden, the indefatigable naturalist of the 'Alert,' came across the most northern traces of man that have ever yet been found. They consisted of the frame-work of a large wooden sledge, a stone lamp, and a very perfect snow scraper made of a walrus tusk. The point where these relics were found is at the narrowest part of Robeson Channel, where it is only 13 miles across. This then was, probably, the point selected for crossing, and the heavy sledge may have been left behind, owing to the difficult and dangerous nature of the ice to be encountered. Captain Feilden conjectures that this spot marks the *Ultima Thule* of human advance. The tremendous ice of the polar sea to the north, and the absence of animal life, formed an impassable barrier. Northwards from this point no trace of men was ever found. In connection with previous researches, the ethnological results of the late expedition are of great interest and value.

As regards the mammals, a large extent of country was carefully worked by the naturalists, zealously assisted by other officers, and no species can have escaped their united observations. Through their diligent research much new information was obtained respecting the habits of the Arctic mammals. Close examination of the haunts of white foxes brought to light numerous *caches*, or stores of provisions. In one alone there was a heap of over fifty dead lemmings, concealed under a pile of stones; in another, half of a hare and wings of brent geese. It is also very striking that the increased vegetation induced by the presence of the foxes should be the means of attracting and sustaining the lemmings in the immediate vicinity of the foxes' dens. Captain Feilden also observed the habits of the lemmings with very close attention, and of the Arctic hare; and he has added considerably to previous knowledge respecting the musk oxen, their habits and migrations. He was also able to place in the hands of Dr. James Murie specimens of the stomach and other organs, which will give a further insight into the anatomy of this interesting animal. With, if possible, even closer attention, the birds of the far north were studied, for ornithology is the branch of natural history to which Captain Feilden, the accomplished naturalist of the 'Alert,' has long devoted himself. The place of breeding for knots and sanderlings was reached, and several young birds were obtained. Twelve species of mammals and twenty-four species of birds fully described, and their habits and migrations closely and most carefully investigated, are the results of the expedition in this branch of science. The fishes collected by the expedition have been reported upon by Dr. Gunther, of the British Museum. The most northern salt-water fish was obtained by Lieutenant Egerton, in 82° 30′ N. It was a *Cottus quadricornis*, a fish which is not included in Dr. Lutken's list of Greenland fishes. The most northern fresh-water fish is a charr (*Salmo Arcticus*), several specimens of which were found in small lakes as far north as 82° 34′ N.

The collection of *mollusca* made by the late expedition embraces thirty-five species between 79° and 82° 30′ N., and represents very fully the molluscan life within those parallels. For the researches in this department were not confined to dredging. Recent sea-beds, extending from the present sea margin to a height of not less than a thousand feet, are being deposited, at the present day, under precisely the same physical conditions as those now being elevated above the sea level, which give satisfactory evidence that the molluscan fauna of the past, represented by these post-tertiary deposits, is precisely that now existing in the adjacent sea. Upwards of fifty spots, where these post-tertiary beds occur, were carefully examined by Captain Feilden and the officers who zealously assisted him. Thus large deposits of recently-emerged sea-bed were laid open to investigation, and this circumstance rendered the researches in this branch of natural history especially exhaustive and satisfactory.

The *crustacea* brought home by the expedition, although not including many novelties, are of great interest, on account of the high and hitherto unexplored latitudes in which they were collected. The most northerly species obtained, and, indeed, the most northerly known animal in the world, is the *Anonyx nugax*, several examples of which were dredged up by Captain Markham in 72 fathoms, in latitude 83° 19′ N. The next most northerly species is the *Hippolyte aculeata*, found in 82° 30′ N. The number of species collected north of Smith Sound was thirty-one.

The collections of *insecta* and *arachnida*, 45 species of the former and 16 of the latter, are very important. They have been examined and discussed by Mr. McLachlan.

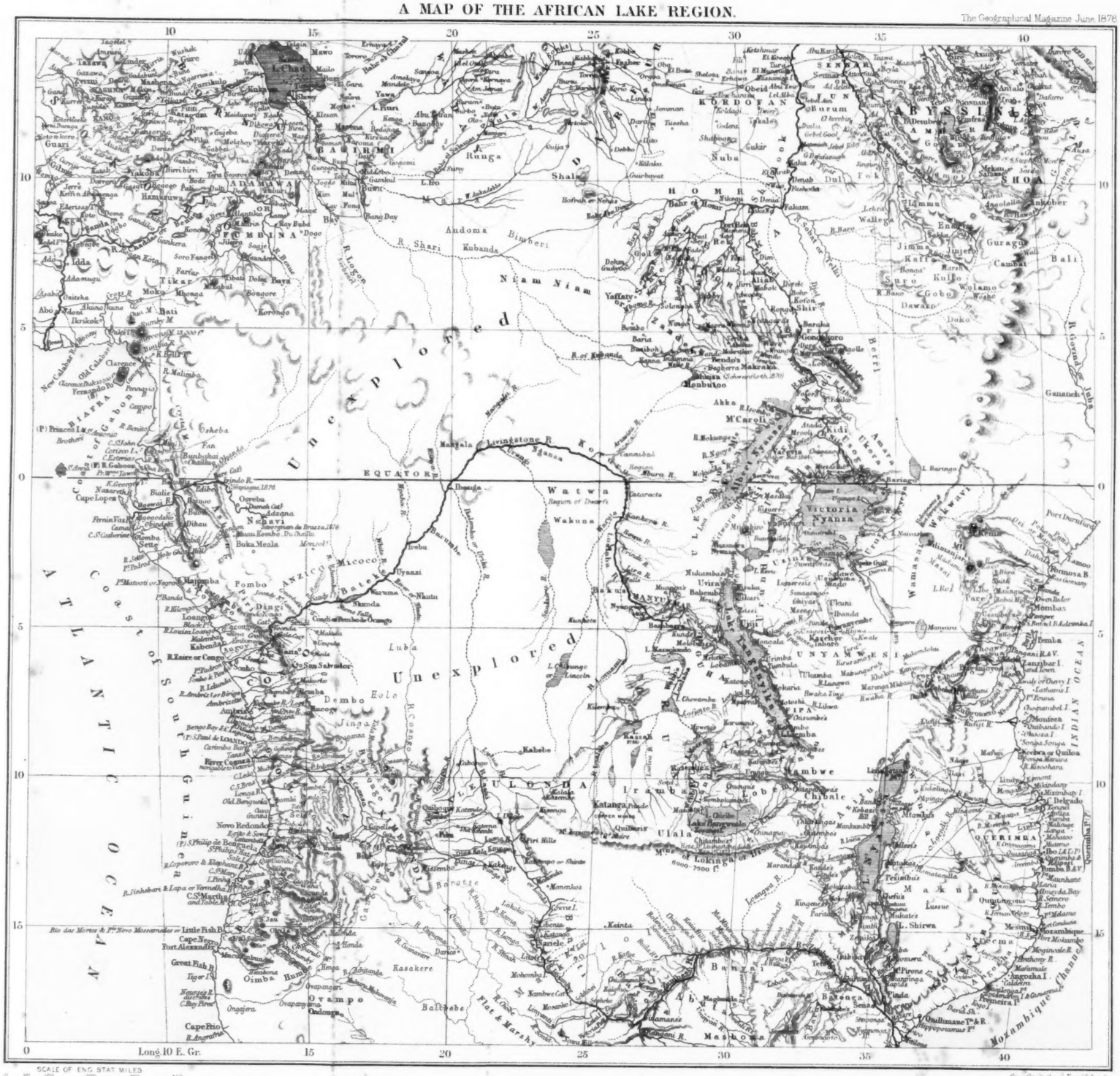
The *echinodermata* of the expedition have been reported upon by Professor Martin Duncan and Mr. Percy Sladen. The collection is so interesting, and the specimens are so valuable, that these eminent men of science have described it in a separate monograph. Similar reports have been made on the collections of *polyzoa*, *spongida*, *hydrozoa*, *foraminifera*, and *polycystina*.

The plants were examined and named by Professor Oliver, and Sir Joseph Hooker has written a most interesting memoir on the botanical results of the expedition. They prove that the vegetation of the newly-discovered area is entirely Greenlandic. The collection consists of no fewer than 69 flowering plants and ferns that can be identified, and 6 more in an imperfect condition; being 10 more than were collected at Melville Island in a much milder climate, and only 23 less than have been found in Spitzbergen. Mr. Mitten has reported on the mosses, and Mr. Berkeley on the fungi.

Such then, very briefly and inadequately stated, are the results of the late Arctic Expedition. They are the work of one year and a half of arduous toil; and they undoubtedly repay—fully and completely—the expense, and the dangers, hardships, and, alas! the losses which it was necessary to encounter and to suffer, in securing them. But there is yet one other result to record, which, though mentioned last, is not the least to be considered. In advocating the renewal of Arctic exploration, Admiral Sherard Osborn specially dwelt upon the importance of encouraging a spirit of maritime enterprise, and of giving worthy

A MAP OF THE AFRICAN LAKE REGION.

The Geographical Magazine June 1876



employment to our navy in time of peace—a truly national object, and one which should have as much influence in forming a decision to despatch an expedition, as the anticipated scientific results. That great object has also been secured. The interest in Arctic service, always popular in former days, has been revived. We now once more have a supply of young but experienced ice-navigators and sledge travellers, trained in the best school, where they have done their work right well, and who are willing and ready to face new dangers, and to win new laurels in the polar seas.

We have endeavoured to explain the nature of the difficulties and dangers which were encountered and overcome; and we have enumerated the results that have been secured. Our readers are now in a position to form their own judgments as to the degree of success which may be claimed for the late Arctic expedition. Our deliberate conclusion is that the scientific expedition commanded by Sir George Nares was, all things considered, the most successful that ever crossed the Arctic Circle.

But whether its success was great or small there is at least concurrence among scientific men that its rich and varied results are valuable. Thus the first great step has been accomplished by the advocates of Arctic discovery. The work has been revived. An expedition has been despatched, has manfully done its work, and has returned with a valuable increase to the sum of human knowledge. It remains to consider the next step, and to take care that this one success shall not be a spasmodic effort, but that it shall be the commencement of continuous work in the same direction, to be persevered in until it is complete.

The arguments for the continuance and completion of polar discovery are the same as those for its renewal. If the encouragement of maritime enterprise and the exploration of the polar region were objects of sufficient importance to justify the despatch of an expedition to commence the work in 1875, those objects still exist, and the arguments for continuing and completing the work are quite as strong in 1878 as they were in 1875. Indeed the success of the late expedition, and the experience gained by it, gives new strength to those arguments; while the recent discoveries add fresh interest to Arctic research, and give additional scientific importance to its completion.

There is a vast area, teeming with interest in every branch of inquiry, which is still unknown. There is the gap of 400 miles between Aldrich's furthest and Prince Patrick Island, to be approached by the Jones Sound route. There is the discovery of the northern side of Greenland, from Beaumont's furthest to Cape Bismarck, on the east coast. There is the exploration of the northern shores of the Franz Josef Land. There is the mysterious Wrangell Land. There is the North-east Passage. Abundance of glorious work in many directions; but, on the whole, the East Greenland route is the best that can be selected for the next Arctic Expedition. Britain ought not to relax her efforts after one success. There should be continuity in her measures, and there should be steady perseverance in the good work, until the exploration of the unknown region round the North Pole is finished.

HENRY M. STANLEY IN THE AFRICAN LAKE REGION.

THROUGH the courtesy of the publishers, we have been supplied with a portion of the proof-sheets of Mr. Stanley's book, which will enable us to give our readers a general idea of the contents of his first volume. This part of the work embraces the period from the departure of Stanley's expedition to its arrival at Ujiji, including the exploration of the Victoria Nyanza. The second volume, of which we shall give a complete and extended review in our July number, contains the narrative of Stanley's discovery of the course of the Congo, from Nyangwé to the furthest point reached by Captain Tuckey above the falls.

Mr. Stanley, as is well known, was employed by the *Daily Telegraph* and the *New York Herald* to achieve geographical discoveries in Central Africa. But the plan of completing the researches of Speke in the lake region, and then of exploring the course of the Congo, originated with himself. The principal feature in Mr. Stanley's equipment was the boat constructed in sections, which was built by Mr. James Messenger, of Teddington. It was 40 feet long, 6 feet beam, and 30 inches deep, of Spanish cedar $\frac{3}{8}$-inch thick, and was built in five sections each 8 feet long. Mr. Stanley took with him a young man named Frederick Barker, who had been a clerk at the Langham Hotel, and the two sons of Mr. Henry Pocock, a fisherman of Lower Upnor, in Kent. Francis and Edward Pocock were the nephews of a gallant seaman who served and perished in Sir John Franklin's expedition. They were fine stalwart young men, full of courage and enthusiasm. On the 15th of August 1874 the party left England for Zanzibar, where they arrived on the 21st of September. The preparations were then expeditiously proceeded with and completed, the total weight of goods to be carried being 18,000 lbs., divided into loads weighing 60 lbs. each, and requiring, therefore, the carrying capacity of 300 men: 1300*l.* were also paid for advances of pay and rations to the men who had been engaged—230 Wanyamwezi, Wangwana, and coast people, and a supernumerary force of forty men, recruited at Bagamoyo and the Rufiji delta. On the 12th of November six Arab vessels conveyed the expedition from Zanzibar to the mainland.

The first part of Stanley's march, as far as Mpwapwa, was across the country which has frequently been traversed from Bagamoyo to Unyanyembé, but a little to the northward of former tracks. But on the 1st of January 1875, he struck north, leaving for the first time the path to Unyanyembé, the common highway of East Central Africa. Extraordinary difficulties accompanied him in this first entrance into an undiscovered region. He had to make his way over a country consisting of dense bush where provisions ran short, and sickness broke out among the people, which culminated in the illness and death of poor young Edward Pocock, on the 17th of January.

These painful marches brought the explorers to the most southern of the Nile sources. Stanley says:—

"Since leaving Mpwapwa, we have not crossed one perennial stream. All our drinking water has been obtained from pools, or shallow depressions lately filled by rain. Between Suna and Chiwyu was crossed

one small rill flowing north-easterly, which soon afterwards joins another and still another, and gathering volume, swerves north, then north-west. These are the furthest springs and head-waters of a river that will presently become known as the Leewumbu, then as the Monangah, and lastly as the Shimeeyu, under which name it enters Lake Victoria on the south-east coast of Speke Gulf. The length of its course, from the sources to the lake is 300 miles, which gives the course of the Nile a length of 4200 miles."

On the evening of the 21st of January the party arrived at Vinyata, in Ituru, where, consistent with custom, the camp was constructed on the summit of a slightly-swelling ground. Here one of the men was found murdered close to the camp, and soon afterwards war cries were heard, and a large mob approached, evidently with hostile intentions.

"In the midst of this, Soudi, a youth of Zanzibar, came hastily upon the scene. He had a javelin gash near the right elbow joint, and a slight cut as though from a flying spear was visible on his left side, while a ghastly wound from a whirling knobstick had laid open his temples. He reported his brother Suliman as lying dead near the forest, to the west of the camp.

"We decided, nevertheless, to do nothing. We were strong disciples of the doctrine of forbearance, for it seemed to me then as if Livingstone had taught it to me only the day before. 'Keep silence,' I said; 'even for this last murder I shall not fight; when they attack the camp, it will be time enough then.' To Frank I simply said that he might distribute twenty rounds of ammunition without noise to each man, and dispose our party on either side of the gate, ready for a charge should the natives determine upon attacking us."

Next day the camp was again attacked by a body of men of the Wanyaturu tribe.

"On the morning of the 25th we waited until 9 A.M., again hoping that the Wanyaturu would see the impolicy of renewing the fight; but we were disappointed, for they appeared again, and apparently as numerous as ever. After some severe volleys we drove them off again on the third day, but upon the return of the Wangwana, instead of dividing them into detachments, I instructed them to proceed in a compact body. Some of the porters volunteered to take the place of the soldiers who perished the previous day, and we were therefore able to show still a formidable front. All the villages in our neighbourhood being first consumed, they continued their march, and finally attacked the rocky hill, which the Wanyaturu had adopted as a stronghold, and drove them flying precipitately into the neighbouring country, where they did not follow them.

"We knew now that we should not be disturbed. Some of the guns, lost the day before, we re-captured. On reckoning up our loss on the evening of the third day, we ascertained it to be twenty-two men killed, three men wounded, twelve guns lost, and four cases of ammunition expended. Including Kaif Halleck and Suliman murdered, our losses in Ituru were therefore twenty-four men killed and four wounded, and as we had twenty-five on the sick list, it may be imagined that to replace these fifty-three men great sacrifices were necessary on the part of the survivors, and much ingenuity had to be exercised. Twelve loads were accordingly placed on the asses, and ten chiefs were detailed to carry baggage until we should arrive in Usukuma. Much miscellaneous property was burned, and on the morning of the 26th, just before daybreak, we resumed our interrupted journey.

"The expedition on this day consisted of three Europeans, 206 Wangwana and Wanyamwezi, twenty-five women, and six boys. At 9.30 A.M. we camped at a place which might be called a natural fortress. To our right and left rose two little hills 100 feet high and almost perpendicular. Behind us dropped a steep slope 400 feet down to the Leewumbu river, so that the only way of access was the narrow gap through which we had entered. We soon closed the gateway with a dense wall of brushwood, and in perfect security lay down to rest.

"This camp was at an altitude of 5650 feet above the ocean, and due west of Vinyata about 10 miles. On one side of us was the deep-wooded valley through which the rapid Leewumbu rushes. Its banks on each side slope steeply upwards, and at the top become detached hills clothed with forest. On the 27th we crossed the Leewumbu, and the whole of that day and the next our route was through a forest intersected by singular narrow plains."

We have quoted Mr. Stanley's account of the above encounter with the natives, and we believe that our readers will concur in the opinion that nothing was done, on this occasion, which had not become absolutely necessary for self defence.

On the 17th of February, having surmounted a ridge which bounds the valleys of the Leewumbu, or Monangah, on the north, the explorers reached "Usiha, at the commencement of a most beautiful pastoral country, which terminates only in the Victoria Nyanza. From the summit of one of the weird grey rock piles which characterize it, one may enjoy that unspeakable fascination of an apparently boundless horizon. On all sides there stretches toward it the face of a vast circle replete with peculiar features, of detached hills, great crag-masses of riven and sharply-angled rock, and outcropping mounds, between which heaves and rolls in low, broad waves a green grassy plain, whereon feed thousands of cattle scattered about in small herds.

"As fondly as the Wangwana with their suffering vitals lingered over their meals in the days of plenty at Mombiti, so fondly did I gloat over this expanding extent, rich in contrasts and pleasing surprises. Fresh from the tawny plains of Monangah, with its thirsty and sere aspect, I was as gratified as though I possessed the wand of an enchanter, and had raised around me the verdant downs of Sussex. I seated myself apart, on the topmost grey rock. Only my gunbearer was near me, and he always seemed intuitively to know my moods. I revelled therefore undisturbed in the bland and gracious prospect. The voices of the Wangwana came to me now and again faint by distance, and but for this I might, as I sat there, have lost myself in the delusion that all the hideous past and beautiful present was a dream.

"After the traveller has performed his 600 miles from the ocean to Usiha, however phlegmatic he may be, he will surely glow with pleasure when he views this fair scene of promise. The delicious smell of cattle and young grass comes up from the plain quick, and reminds one of home-farm memories, of milk

and cheese, and secret dippings into cream-pots, and from the staked bomas and the hedge-encircled villages there rise to my hearing the bleating of young calves, and the lowing of the cows as they looked interested towards the village, and I could see flocks of kids and goats, and sheep with jealously-watchful shepherd-boys close by—the whole prospect so peaceful and idyllic that it made a strangely affecting impression on me."

Proceeding through this country, they reached the village of Kagehyi on the 27th. "We dipped into the basins and troughs of the land, surmounted ridge after ridge, crossed water-courses and ravines, passed by cultivated fields, until, ascending a long, gradual slope, we heard on a sudden hurrahing in front, and then we too knew that those in the van were in view of the Great Lake." Stanley and his party, from November 17th, 1874, to February 27th, 1875, had walked over 720 miles in 103 days, being 70 marching and 33 halting days.

The explorer was now on the southern shore of that famous Victoria Nyanza, which he had determined to circumnavigate; and the news of his arrival spread far and wide:—

"The village of Kagehyi, in the Uchambi district and country of Usukuma, became after our arrival a place of great local importance. It attracted an unusual number of native traders from all sides within a radius of twenty or thirty miles. Fishermen from Ukerewé, whose purple hills we saw across the arm of the lake, came in their canoes, with stores of dried fish; those of Igusa, Sima, and Magu, east of us in Usukuma, brought their cassava, or manioc, and ripe bananas; the herdsmen of Usmau, thirty miles south of Kagehyi, sent their oxen; and the tribes of Muanza—famous historically as being the point whence Speke first saw this broad gulf of Lake Victoria—brought their hoes, iron wire, and salt, besides great plenty of sweet potatoes and yams."

In a few days the boat, named by Stanley the 'Lady Alice,' was ready and strengthened for rough sea life, a crew of ten men and a steersman were selected; and the leader of the expedition prepared to embark with the object of circumnavigating the lake; while Frank Pocock and Barker remained in charge of the camp at Kagehyi. Stanley set sail on the 8th of March, 1875, eastward along the shores of the broad arm of the lake, which he called 'Speke's Gulf.'

His account of his voyage round the eastern and northern shores of the lake is most interesting, and during April 1875, he was with M'tesa, the Emperor of Uganda, where he met M. Linant de Bellefonds, who had been sent on an embassy to Uganda, by Colonel Gordon. Stanley thus describes the Uganda potentate:—

"In person M'tesa is tall, probably 6 feet 1 inch, and slender. He has very intelligent and agreeable features, reminding me of some of the faces of the great stone images at Thebes, and of the statues in the museum at Cairo. He has the same fulness of lips, but their grossness is relieved by the general expression of amiability blended with dignity that pervades his face, and the large, lustrous, lambent eyes that lend it a strange beauty, and are typical of the race from which I believe him to have sprung. His colour is of a dark red brown, of a wonderfully smooth surface. When not engaged in council, he throws off unreservedly the bearing that characterizes him when on the throne, and gives rein to his humour, indulging in hearty peals of laughter. He seems to be interested in the discussion of the manners and customs of European courts, and to be enamoured of hearing of the wonders of civilization. He is ambitious to imitate as much as lies in his power the ways of the white man. When any piece of information is given him, he takes upon himself the task of translating it to his wives and chiefs, though many of the latter understand the Swahili language as well as he does himself."

The strangers were witnesses of a naval review in Murchison Bay. The Uganda fleet consisted of forty canoes containing about 1200 men. M'tesa promised that he would furnish Stanley with transport sufficient to convey his expedition by water from Kagehyi to Uganda; and a chief named Magussa was ordered to escort him with thirty canoes, which were, however, not ready when Stanley departed.

During the return voyage nothing of importance occurred until the explorers approached the Bumbireh group of islands in order to obtain provisions. Bumbireh Island is about 11 miles long by 2 broad, and presents the appearance of a hilly range with a tolerably even and softly-rolling summit line clothed with soft grass. Its slopes are generally steep, yet grassy or cultivated. It contains probably fifty small villages, averaging about twenty huts each, and a population of 4000 souls. Herds of cattle were grazing on the summit and slopes, and extensive banana groves marked most of the village sites. "There was a kindly and prosperous aspect about the island."

But the people raised war cries and made hostile demonstrations as the canoes approached. The provisions were exhausted, and, forced by hunger, Stanley and his crew continued to approach, when suddenly the savages rushed into the water and dragged the boat high and dry for about 20 yards. "Then ensued a scene which beggars description. Pandemonium—all its devils armed—raged around us. A forest of spears was levelled; thirty or forty bows were drawn taut; as many barbed arrows seemed already on the wing; thick, knotty clubs waved above our heads; two hundred screaming black demons jostled with each other and struggled for room to vent their fury, or for an opportunity to deliver one crushing blow or thrust at us."

Then the King of Bumbireh, named Shekka, retired to consult with his chiefs, and several men made a rush at the boat and seized the oars, an act which was greeted with a loud cheer; and, as they were assured that their victims could not escape, the savages withdrew to the nearest village to refresh themselves. In a short time they again appeared, armed and prepared for battle, to the number of 300, while Shekka refused to give any pledge of peace. Then, with great presence of mind, Stanley faced the enemy, while his people suddenly launched the boat, and they all sprang in. The savages rushed furiously down to the water's edge, but too late. Stanley kept up a steady fire upon them, while his crew tore the bottom boards out of the boat to use as oars.

They were saved. They heard a voice cry out, "Go and die in the Nyanza!" They were twelve hungry men, and they only had four bananas in the

boat. In the morning there was no land in sight: all was a boundless circle of grey water. At length they reached an uninhabited island, which they called "Refuge Island," where they found rest and food, and on the 6th of May, after having achieved the great geographical feat of circumnavigating the Victoria Nyanza, Stanley arrived at Kagehyi and rejoined his camp. Frank Pocock was well, but poor Frederick Barker had died twelve days previously. Stanley had thus set at rest for ever the question whether the Victoria Nyanza is one or several lakes. Speke was right. He had merely over-estimated the extent of the lake. His sketch gave it an area of 29,000 square miles. Stanley's survey has reduced it to 21,500 square miles. (For a map showing Stanley's track round the Victoria Nyanza, see our number for September 1876, facing page 245.)

Preparations were then made for the departure of the whole expedition to Uganda by water. By the 19th of June 1874, grain, sesamum, millet, and Indian corn had been purchased to the amount of 12,000 lbs., and stowed in sacks. On the 20th the embarkation was commenced of 150 men, women, and children, with 100 loads of cloth beads and wire, 88 sacks of grain, and 30 cases of ammunition; but there was a disastrous start necessitating repairs for the canoes, and it was not until the 6th of July that they were fairly off. During the long voyage round the lake it was necessary to pass the hostile Island of Bumbireh; and Stanley was obliged to halt on a neighbouring island called Mahyiga. Antari, the King of the main land called Ihangiro, and Suzerain over Bumbireh, declared that he would not allow strangers to travel by sea, and that they must go back, adding that, if Stanley did not obey, he should be killed and all his party. Meanwhile Antari sent large re-inforcements to Bumbireh. Stanley's reply was that he intended to go to Uganda, whether Antari would let him or not. Soon afterwards he was joined by six canoes from Uganda, and heard that M'tesa had believed him to have been murdered at Bumbireh, and had sent an expedition in search of news. The leader of these canoes was named Sabadu. A search expedition consisting of eight more canoes arrived next day; but it was evident that the departure of the expedition to Uganda would be hotly contested by Antari and the people of Bumbireh. A small party of Waganda had obtained leave to land and cut bananas on Bumbireh, when they were treacherously attacked, and six lost their lives.

This being the position of affairs, Stanley had to decide what course to adopt, and we will give his explanation of the events which followed in his own words:—

"Alone with myself, I began to discuss seriously the strict line of duty. If it were a military expedition that I commanded, duty would have pointed out the obvious course to follow; but though the expedition was governed for its own well-being after military principles, it was an expedition organized solely for the purposes of exploration, with a view to search out new avenues of commerce to the mutual advantage of civilization and such strange lands as we found suitable for commercial and missionary enterprise. But whatever its character, its members possessed the privilege of self-defence, and might justly adopt any measures, after due deliberation, for self-protection. The principles of right and justice every educated Christian professes to understand, and may be credited with a desire to observe, but in addition to these, it was desirable in a person in my position—knowing how frequently it is necessary to exercise them in barbarous lands—to remember charity and forbearance, in order to ensure the objects in view, and to create good impressions for the benefit of those who might succeed the pioneer.

"Thirteen days had elapsed since our arrival at Mahyiga, and the thirteenth day was signalized by this bloody attack upon people entrapped to their death maliciously, and evidently by a preconcerted arrangement between Antari's elders and the chiefs at Bumbireh. Sabadu said also that the last words he had heard as the Waganda paddled away from Bumbireh were, 'Look out for mischief to-morrow,' which no doubt meant that the war 'shauri' was nearly terminated, and that all were by this time worked up into proper fighting spirit.

"The expedition was now ready to move towards Uganda, but the waterway had first to be opened; whatever plot was on hand must be frustrated, and treachery punished; otherwise impunity would inspire an audacity which might be dangerous to our safety.

"Apart, therefore, from a duty owing to the wounded Waganda and the dead chief of Kytawa, as well as to our respect for and gratitude to M'tesa and Kytawa—apart from the justice which, according to all laws human and divine, savage and civilized, demands that blood shall atone for blood, especially when committed with malice prepense, and the memory of our narrow escape from their almost fatal wiles, and the days of agony we had suffered—there lay the vital, absolute, and imperative necessity of meeting the savages lest they should meet us. For they were by this time reinforced by about 2000 auxiliaries from the mainland; they were flushed with triumph at their success in the snare they had set for the unsuspecting Waganda, and the sight of their dead victim would only inspire them with a desire for more blood.

"As I could not see any way to avoid the conflict, I resolved to meet them on their own island, and by one decisive stroke break this overweening savage spirit. I should, however, wait the result of my last message, for it might be that the capture of one of Antari's sons might induce them to embrace peaceful proposals.

"Accordingly next morning a couple of ammunition boxes were opened, and twenty rounds distributed to each man who bore a rifle or musket; 230 spearmen and fifty musketeers were detailed for a fighting party, and eighteen canoes were prepared to convey them to Bumbireh.

"I waited until noon, having gazed through a field-glass many times in the direction of Bumbireh, but nothing was observed approaching Mahyiga."

The distance from Mahyiga to Bumbireh was about 8 miles, and Stanley did not arrive before the latter island until 2 P.M., finding the heights crowded with large masses of men, and every point manned with watchmen. The savages hurried from their coverts between 2000 and 3000 in number; and Stanley, anchoring his boats in line, after a fruitless parley, opened fire. After a few rounds the savages were cowed, and the safety of the passage was secured. The passage of the channel with the women and

children and the property of the expedition was now safe, and they started for Uganda on the 5th of August, with a fleet consisting of the boat and 37 canoes containing 685 souls.

After carefully reconsidering Mr. Stanley's detailed explanation of this affair at Bumbireh, we are glad to repeat what we said in the article in our number for March 1878 (page 53) that self-defence and the imperative duty of securing the safety of the hundreds of men, women, and children under his charge, fully and completely justified him in the course he adopted.

Stanley remained at Uganda, the guest of M'tesa, during the months of September and October 1875, and his work contains several very interesting chapters on M'tesa's wars, on his conversion to Christianity, and on life and manners in Uganda in the different classes of society—the *kopi* or peasant, the *mkungu* or chief, and the *kabaka* or emperor. He describes the form of the Empire governed by M'tesa as a crescent, its length 300 and its breadth about 60 miles, covering, with the lake islands, an area of 30,000 square miles; and 70,000 including the tributary States of Unyoro, Ukedi, and Ankori. He estimates the population at 2,775,000. The productions are ivory, coffee, gums, resins, myrrh, lion, leopard, otter and goat skins, ox hides; cattle and sheep. The vegetable products are the papaw, banana, yams, sweet potatoes, peas, beans, melons, cucumbers, and tomatoes, rice, wheat, maize, sesamum, millets, and vetches. There are also fine forests of great extent.

From Uganda Mr. Stanley made an expedition westward from Victoria Nyanza to Beatrice gulf or lake, which he believed to be a portion of the Albert Nyanza. He thus describes the intervening country:—

"Starting from the sea-like expanse of the Victoria lake, the traveller would be ushered into the depths of a tall forest, whose meeting tops create eternal night, into leafy abysms, where the gigantic sycamore, towering mvulé, and branchy gum strive with one another for room, under whose shade wrestle with equal ardour for mastery the less ambitious trees, bushes, plants, lianas, creepers, and palms. Out of this he would emerge into broad day, with its dazzling sunshine, and view an open rolling country, smooth rounded hills, truncated cones, and bits of square browed plateaus, intersected by broad grassy meads and valleys thickly dotted with ant-hills overgrown with brushwood. Few trees are visible, and these, most likely, the candelabra or the tamarisk, with a sprinkling of acacia. As some obstructing cone would be passed, he would obtain glimpses of wide prospects of hill, valley, mead, and plain, easy swells and hollows, grassy basins and grassy eminences, the whole suffused with fervid vapour.

"These scenes passed, he would find himself surrounded by savage hills, where he would view the primitive rock in huge, bare, round-backed masses of a greyish-blue colour, imparted to them by moss and lichens, or large fragments flung together as in some Cyclopean cairn, sundered and riven by warring elements. At their base lie, thickly strewn, the *débris* of quartz-veined gneiss and granite and iron-coloured rock, half choking the passage of some petty stream, which vents its petulance, as it struggles through it to gain the clear, disencumbered valley and the placid river, guarded by banks of slender cane and papyrus.

"And then the traveller would observe that the valleys are gradually deepening, and the hills increasing in height, until suddenly he would be ushered into the presence of that king of mountains, Mount Gordon Bennett, which towers sheer up to the azure with a white veil about his crown. Escaping from the vicinity of this mountain monarch, he would be swept over a brown parched plateau, and then, all suddenly, come to a pause at the edge of an awful precipice, some 1500 feet in depth. At the bottom of this, slumbering serenely, and reflecting the plateau walls on its placid surface, lies the blue Luta Nzigé."

In February 1876, Mr. Stanley took leave of M'tesa, and crossing the river Kitangule, which was discovered and named by Speke, entered the territory of Rumanika, King of Karagwe. In this country Mr. Stanley collected much valuable geographical information, and personally explored the little lake Windermere of Speke, the Ihema island, the hot springs of Mtagata, and part of the Kitangule valley.

From Karagwe Stanley made his way to the shores of the lake Tanganyika at Ujiji, where he arrived on the 27th of May 1876.

Great as the value of Mr. Stanley's geographical researches are, and absorbing as is the interest excited by his narrative, we are inclined to attribute equal importance to the ethnological portions of his first volume. He has been most assiduous in collecting and arranging information respecting the habits and modes of life of the people, their arts and manufactures, and his account of the kingdom and people of Uganda especially is most valuable.

THE PRODUCTIVE ZONES OF RUSSIA IN EUROPE.*

THE Russian dominions embrace within their enormous extent most varied economic products, which offer a striking contrast one with the other. The different regions or zones admit of convenient division into five, which, in European Russia, are especially marked. These are, starting from the north, the *tundras*, then the forest and agricultural regions (forming three zones), and the steppes.

The tundras, those bare, damp Arctic wastes, are, as a rule, to be found between the Arctic Circle and the Polar Ocean. They are frozen in winter, and generally thaw to the depth of a foot or so in summer. Turf moss (*sphagnum*) and reindeer moss (*cladonia rangiferina*) are both to be found, and the latter is a product of economic importance, though in eight or ten days a herd of reindeer will generally exhaust a pasture of it. These animals yield so little milk that, according to Charles Vogt, it takes at least 100 of them to support one family. It is reckoned that there are 340,300 reindeer in the Government of Archangel alone, but this government includes forest and other land besides tundras. The entire area of the tundras in Europe amounts to about 144,820 square miles (English).

* This article is based on an interesting and fuller one by Dr. O. Krummel in the *Geographische Blätter* of the Bremen Society. The author expresses his acknowledgments to the "Map showing the areas of production in Europe," published by the Ilyin Institute in 1873; to E. Réclus's work (*La terre*, i. p. 99); to Oscar Peschel's lectures; and to various independent sources.

The Forest Zone extends southward of the isothermal line of 8° R. in July (which is coincident with the limit of trees), as far as the 60th parallel of latitude, and embraces the greater part of Finland, the Governments of Olonetz, Vologda, Archangel (*minus* the tundras), and the northern districts of Novgorod, Vyatka, and Perm. All here that is not moor, lake or river, is covered with a perfect ocean of forest, in which cultivated oases are rare. It forms fully two-thirds of the entire forest area of Russia and covers 815,790 square miles. The density of population amounts to between 13 and 14 souls to the square mile.

In Novgorod and Vyatka the wealth of timber has been diminished by cultivation, or to speak more properly, by firing the forests; in Finland the forest area is limited through the space monopolized by its enormous lakes and its rocky soil. The four northern Governments of Archangel, Vologda, Olonetz, and Uleaborg, cannot expect ever to attain a much higher degree of cultivation than at present. The inhabitants prefer the chase to agriculture, and devote only three months to the latter instead of seven or eight as in other countries.

This forest region is important from an economic point of view, as it produces fur, timber, tar, and potash, but it is only during three months of the year that the condition of the rivers admit of these products being conveyed down by boat to the South or to the White Sea. The tar and pitch annually prepared in Northern Russia amounts to 330 millions of Russian pounds. Perm, Novgorod, and Vyatka are rather better circumstanced as regards fertility and productiveness of soil, and the last province exports cereals in a slight degree to the neighbouring province.

The third division, the cultivated zone, leads from the 60th parallel southward to the steppes. The geological features of this zone are noticeable. The northern and central portions are a diluvial deposit, which forms a thin sandy soil for cultivation, requiring plentiful manuring and careful handling, owing to the frequency of stones. In the western and eastern portions cultivation has existed for a much longer period, a more scientific system prevails, and the fertility is on the whole greater. On the other hand, the southern zone, consisting of the "black earth" (Chornosyom), yields rich harvests without manuring or labour. The entire zone may thus be subdivided into northern and southern, or belts of weak and strong cultivation, to the latter of which may be added the Baltic and Polish provinces.

The region of weak or slight cultivation includes fifteen entire governments and parts of others, with a total area of about 371,900 square miles. The average density of population is 54 to the square mile. The following table shows the relative proportions of forest and cultivated land:—

	Per-cent. of total area. Cultivated.	Forest.		Per-cent. of total area. Cultivated.	Forest.
St. Petersburg	16·3	44·0	Tver	31·7	31·6
Pskov	32·3	48·9	Yaroslav	35·0	34·0
Vitebsk	45·2	41·8	Vladimir	43·8	46·8
Minsk	24·0	45·0			
Mohilev	45·7	27·0	Nishegorod	38·7	49·6
Smolensk	38·1	34·8	Kostroma	20·6	67·1
			Kazan	44·0	40·4
Kaluga	53·7	25·1	Simbirsk	47·9	35·0
Moscow	39·0	38·1	Ufa	10·3	52·5

This region yields too little wheat for the support of its inhabitants; the produce is only 1·7 *chetverts* per head, whereas the lowest quantity reckoned as essential for health is 2·3 *chetverts* per head. The yield is thus sufficient for only 270 days in the year, and for the remaining 95 days the inhabitants must rely on imported grain, for which they pay by their manufacturing industries. In the governments of Moscow, St. Petersburg, Vladimir, Southern Perm, Iver, Riazan, Yaroslav, and Kaluga, about half the entire industrial wealth of Russia is concentrated, in the order of precedence in which they are placed; the Government of Moscow alone turns out 18 per cent.: here the manufacturing industry has its centre and flourishing cotton flax and silk spinning mills and yarn manufactories are to be found. The materials are handed over to the peasants, who spend all their time in weaving, spinning, and preparing flax and hemp. The cotton industry is particularly flourishing and almost wholly supplies the clothing wants of the inland population, the finest textures alone being imported. Large consignments of plush, calico, and nankin were exported to the Asiatic markets 1,070,000 roubles' worth in 1873, and 1,120,000 in the following year. This activity contrasts strongly with the low condition of the cloth-manufacturing industry, which would scarcely exist were it not for the heavy protective duty (which, according to Matthaei, amounted in 1873 to 23 per cent. *ad valorem*), although the raw material is at hand in the country itself. The cotton industry, it must be remarked, is also protected against foreign competition by a duty even higher in 1873 (according to the same authority) = 25 per cent. The iron and metal industries (copper and nickel) have their chief seat on the western slope of the Ural, in the Government of Perm, and there are also special manufactures (such as that of arms at Tula) elsewhere. The manufacture of Russia leather is carried on in the Governments of Yaroslav and Tver, while an enormous trade is done in wooden spoons and bast shoes (made from young linden trees). Flax is worked up in the western governments.

The forests, once so rich, are gradually being diminished through supplying the heating material for these manufactures. The frequent conflagrations which overtake houses, stables, sheds, &c., and the artificial heating of dwellings, contribute in no small degree to reduce the stock; while in innumerable cases vast quantities of timber are felled without any thought for the renewal of the supply. The yearly export of timber has increased threefold—from about eleven millions of roubles' worth in 1866 to over thirty-three millions' worth in 1874. It is not to be wondered at, in these circumstances, that the forests in the vicinity of towns are gradually being diminished, and wood steadily rising in price.

This has given an impetus to the coal industry, and the yield of the Moscow district rose from a yearly average of a million and a half puds in 1860-1866 to about nine million puds in 1872. The Moscow coal is used for heating, for smelting, and especially for gas-works, for which it is better fitted than even the Scottish bog-head coal. The chief mines are south of Moscow, on both sides of the Oka, between Kaluga, Tula, and Bielev. The yearly yield of the Polish district in 1872 was much greater than that of Central Russia, being seventeen and a half million

puds. It is a continuation of the deposit of Upper Silesia, but has not attained the same economic importance. The coal district in the Donetz district is an important one to a portion of Russia so destitute of forests as that. It has been known since 1724, and was turned to use by Katharina II. for the purposes of a factory at Lugansk. It was also used extensively during the Crimean war, when the English supply was cut off. The coal is the best in Russia, and though the out-turn has varied considerably, owing to the awkward situation of the deposits and want of communications, it nevertheless amounted to close on thirty-seven million puds in 1872. The deposits on both sides of the Ural, though rich and easy to work, are only used for the neighbouring iron and copper works, and (to a very small extent) for the Volga and Kama steamers.

Taken as a whole, the coal industry of Russia is very small in its yield, being in 1872 only 0·43 per cent. of the whole out-turn of the globe (England's share being 49 per cent., and Germany and the United States about 16 per cent. each). It has, however, increased a good deal more than 300 per cent. since 1866, so that there are good grounds for hope as regards the future.

The zone of rich cultivation bases its chief claim to that title on the black earth above referred to, which Ruprecht of the St. Petersburg Academy considers to be due to the process of turf formation which is always going on, and not to be of marine origin and still less to be the produce of former forests. The first of these last theories (Murchison's) is set at rest by the facts that there are no marine fossils to be found, and that the deposit occurs uniformly on high and low elevations, and there are no forest-tree remains to support the second theory. The black earth is found to extend into Siberia, and it also occurs in the prairies of North America, and in some parts of India. The black earth in Russia has extraordinary fertility, and enables wheat, rye, and maize, to be grown without manuring. Clover, lucerne, and esparcet have been seen to grow there to the height of 15 feet. Forests occur sparsely only in the north, and the zone of black soil is so remarkably destitute of timber that the only fuel besides the droppings of cattle consists in dry, half-wooded grain stalks. Lately, however, the produce of the Donetz coal-beds have found their way here. The total area of the black soil is estimated by Ruprecht "from official statistics" at 250,760 square miles, and by Wilson more than 425,000 sq. miles (?). The soil is found spread over 22 governments, 8 of which belong to the steppe region. The remaining 14 exhibit the following proportions:—

	Per-cent. of total area. Cultivated.	Forest.
Volhynia	33·7	41·9
Podolia.....	52·0	15·1
Bessarabia ..	37·8	9·0
Kiyev	57·0	24·7
Chernigov ..	55·0	19·4
Poltava.....	44·0	6·8
Charkov	46·0	12·8
Kursk	67·0	9·5
Tula	70·0	8·6
Orel	55·0	23·1
Voronesh	60·0	9.1
Riazan	56·0	22.0
Tambor	60·0	17·6
Penza	44·0	6·8

In addition to these, 6 of the West Russian Governments and Poland are noted for their fertility, and exhibit about equal signs of prosperity:—

	Per-cent. of area. Cultivated.	Forest.
Poland	50·1	25·2
Grodno.....	41·3	27·5
Vilna	42·9	30·0
Kovno	55·3	20·6
Kurland	22·2	34·2
Livland	22·0	45·1
Estland.....	15·5	24·9

The produce of wheat in the black-soil country amounts to more than two-thirds of Russia's total produce, while potatoes are chiefly grown in the Polish and Baltic provinces. The high importance of the black soil is further exemplified by the fact that its population forms 53 per cent. of the entire population of the country, and that its crops form 68 per cent. of the total yield of the country. According to Wilson, four-sevenths of the surplus goes to feed the manufacturing zone, while the remainder is conveyed by rail and water to the Black Sea and the Baltic for shipment to the United Kingdom. The value of the grain exported across the European Customs' line in 1874 was 212 millions of roubles. A fraction of surplus grain is converted into spirit, which is also made in Poland and Finland.

In the black soil zone (Kiyev Government) the sugar-boiling factories are to be found. No soil is better suited for the beet than the black earth; but owing to the want of fuel and of facile communications, the sugar is dear and its consumption small. The number of sugar factories in European Russia varies between 200 and 300. The protective duty on foreign sugar is stated by Matthaei to have been as high as 36 per cent. in 1873. This zone suffers very much from the want of proper communications, the few railways requiring to be supplemented by proper inland roads, the present ones being also impassable in wet weather.

The "Scythian deserts" have not changed their character as regards their lack of vegetation since the time of Herodotus, 2000 years ago, so that there is no prospect of a *re-boisement*, which Russians are sometimes sanguine enough to hope for. The vegetation belonging to the forest and cultivated regions of Central and Northern Europe cannot flourish here, owing to the excessive summer heat; and the severity of the winter and spring frosts prevents the growth of the evergreens of Southern Europe. The limit between the steppe and forest zones runs from Kishenau, in Bessarabia, across the Chornosyom to Syzran, on the Volga (53° N. latitude). The chief vegetation found on the steppes is grasses, spiniferous and leafless plants, bulbous plants, &c. In some places, where the soil is salt, the only growth in the steppe is halophytes, cultivation being an impossibility. Forest growth and cultivation is only found in the vicinity of rivers. Fuel is very scarce, Orenburg and Ufa alone drawing a sufficient supply from the Ural forests.

The population of the steppes zone is very sparse, the greatest density being along the rivers banks. On the western and northern confines only of the zone is there any considerable cultivation, the chief dependence of the inhabitants in the typical Cis-Caucasian districts being on their cattle. From the south and south-east portions of the empire are obtained the excellent horses which serve to make the Russian cavalry so excellent and Russia the richest European country for horses. In Russia there are about 10 horses to every 35 human beings, whereas in no other country is the proportion greater than 10 to 100. Between 1871 and 1876 the average number of horses

exported was 25,000 per annum, the value being over 1,500,000 roubles. The steppe zone is also rich in oxen and sheep, which were exported largely, the merino sheep and the fat-tailed sheep being both of great importance, the tail of the latter yielding from 20 to 30 Russian pounds of tallow. It is worthy of remark that the South Russian flocks remain out in the open all the year round, while those in the central part of the empire pass 150 days of the year, and those in the north 200, under cover.

The wine cultivation is not unimportant in the steppe zone, though on the whole the French and German wines are preferred to the home produce. Silk has languished owing to an epidemic among the worms, but previously it had attained a yearly value of four million roubles. Southern Russia is also the chief source of the salt supply to the remaining governments, more than half the total yield being obtained from the salt lakes of Southern Russia and Southern Siberia. The southern side of the Caucasus is characterised by a semi-tropical vegetation, including citrons, pomegranates, &c., which are well described by Gustav Radde in his recent work.

From the above will be seen what varied products Russia can boast, and what scope there would be for the development of the resources of the country under a different policy from that which now prevails.

DOUBLE DELTA OF THE WHANG HO, OR YELLOW RIVER IN CHINA.

PART II.

SHORTLY after the Rev. Mr. Williamson's paper was read at the Shanghai meeting of the North-China branch of the Royal Asiatic Society, a lecture was given on the same subject by W. A. P. Martin, LL.D., President of the Foreign College of Peking, on the 29th March, 1866. A special meeting had been called in order to enable Dr. Martin to give to the Society a description of the interesting route which he had just travelled from Peking to Shanghai; through part of a region, hitherto little known to foreigners, being the first journey of the kind made by a European. In that journey he visited the country in the vicinity of Kai-fung Fu, where the Yellow River had changed its course. Travellers previously, through the Northern Delta, had taken the route of the Grand Canal from Tientsin; but he traversed the Imperial highway from the capital to the provincial city, a distance of fourteen hundred *lee*, or about four hundred and seventy miles, without seeing the canal. This road he found skirted the mountainous region of Chih-li province, just on the western border of the Shan-tung plain, and passing along a fertile country, thickly populated with numerous towns and villages. The ground adjacent to the road, appeared admirably adapted for a line of railway, with no engineering difficulties beyond a few bridges over the small streams. He was also of opinion the amount of traffic existing appeared sufficient to render the line highly remunerative, while a vast increase might be calculated on, as it would be certain to monopolize the communication between the northern and central provinces.

When he arrived at Kai-fung, he crossed the Yellow River, and found that its magnitude did not support its great reputation. Above that city the water was not more than six or seven feet deep, while its breadth at some points was reduced to less than one hundred yards. However, this was at the end of February when the river is at its lowest volume, in consequence of the upper waters and their sources being bound up in ice and snow. Below Kai-fung he ascertained that the divergence of the river took place at I-fung Hien, a town of the third order a few miles to the eastward; whence, after cutting off a small angle of Chih-li, it penetrates Shan-tung. Beyond this point it appeared to have gained in volume, though it had lost in velocity.

About three years afterwards Mr. Oxenham, attached to the British Legation at Peking, traversed the same route as Dr. Martin, and crossed the Yellow River thirty miles above Kai-fung. To reach that point his journey "lay along country roads, tolerable indeed, but narrow tracks after the broad highway along which I had been so long travelling . . . . On reaching the bank the yellow colour of the river attested the correctness of its name, but the current, though by no means slow, did not impress me by its rapidity. The breadth I calculated at about half-a-mile, and from the bank the stream had the appearance of deserving in some degree the approbation as well as the execration of mankind, for so broad a river must be of value to the commercial world; but, embarking in the ferry-boat, by which men, carts, and ponies are conveyed across, I found how I was deceived, for on proceeding across the river we were poled nearly the whole way."

In contrast to these descriptions of the volume and current of "China's Sorrow" above Kai-fung, we may appropriately quote Mr. Williamson's account of its aspect 120 miles below the diverging elbow. It was in the month of November, "when slowly the river dawned on our vision like a mighty yellow dragon lying at rest on the flat land. . . . . After some bargaining we got our huge cart and ourselves on board a large flat-bottomed boat, and crossed to the other side. . . . . I tried to fathom the river. Immediately on our being let go I found the depth 18 feet, but about the centre I could not find ground: owing not to the depth altogether, but to the current and the moving mud. When I first saw the river, with small islets here and there, I imagined it could not be very deep; but, after sailing across, my opinion altered. Here I had a good illustration of the way in which this wilful river behaves. As it flowed against the banks it visibly ate them away; the mud fell into its devouring jaws, reminding one of cattle browsing on, or a cutter mowing grass." Nevertheless, Mr. Williamson was impressed with the apparently diminished volume of the river to what he had seen in Shansi on its upper waters. This he accounted for by concluding that the Yellow River has an outlet for part of its flood by the Ku-lu Ho on its southern bank, and by the Wei Ho to the northward, both junctions being above Kai-fung. The former he inferred from information, that boatmen had joined the Whang Ho by that channel; and for the latter supposition by having met boats going in that direction, which they could not reach—as far as he knew—but by the Wei Ho.

Part of this information was obtained from Mr. Ney Elias, a merchant in Shanghai, who has contributed

a large amount of exploration to our knowledge of the geography of China. In the autum of 1868, he, in company with Mr. Hollingsworth, was sent, under the auspices of the Asiatic Society, to explore the new course of the Whang Ho, from the point where the river leaves its old course, near Kai-fung, to its new embouchure in the gulf of Pe-che-lee. The exploration was conducted successfully as far as Tsi-nan Foo, the provincial city of Shan-tung. From that point Mr. Davis, of Chefoo, sailed down the river, and sounded its depth at intervals on his passage to the sea. The channel ranged from 18 to 26 feet; and a bar formed at its mouth averaged 10 feet at high water, over narrow ground extending about 2 miles. The country in the vicinity of the river appeared to be barren and uninteresting, and there was but a limited traffic of junks on the new channel. That was 10 years ago, when the inhabitants were not certain as to the permanent course of the stream; while they were just recovering from the devastation of their homes and farms by the Nyen-fei rebels, who had been subdued after a sanguinary campaign. Since then the people have laboured successfully under the auspices of the Government, in confining the wayward waters of the Yellow River within defined limits.

In the *Peking Gazette* for December 12th, 1874, we find some interesting information on this head, as follows:—"The Governor-General of the Yellow River, Kiao Sung-nien, memorializes, urging the abolition of the office he holds. . . . . The functions it formerly involved were of a highly onerous nature when the Whang Ho pursued its ancient course to the Whang Hai (Yellow Sea). In addition to the fourteen guard stations connected with the embankments, there were six other stations appertaining to the Grand Canal, and the continuous stream of junks proceeding northward with grain tribute in its full amount of some millions of piculs, requiring administration and control. A change supervened when the Yellow River burst its banks at Tung Wa Siang early in the reign of Hien Fêng, whereupon five of the stations in Honan were abolished, and the whole of the river-work service in Shan-tung was done away with. What remains for the Governor-General of the Yellow River to do lies wholly within the province of Honan; and he is of opinion that greater efficiency would be secured if the functions of his post were concentrated in the hands of the provincial governor. There is now great reason for urging it, inasmuch as in the whole of Shan-tung there no longer exists any embankment works supported by Government, the river being wholly embanked by the people of the adjacent country."

From this memorial we learn that the Whang Ho diverged from its eastern to its northern delta in the early part of Hien Fêng's reign. Now, as that Emperor succeeded Taou Kwang in 1850, we may consider that it happened three years later, or about twenty-five years ago—as suggested in the first part of this paper. Concerning the other topics referred to, the Governor-General's request to relieve him of his post was acceded to, and his duties delegated to the provincial governor. Accordingly we find in the *Gazette* a long memorial from Ting Pao-chen, Governor of Shan-tung, respecting the cost of repairs to the embankments, after one of the river floods. Surveyors had been sent out after they had subsided, when they reported that two breaches required to be filled up, the materials to be supplied by Government and the labour by volunteers. The cost was estimated at 100,000*l.*, and a dyke some 60 miles long would be upwards of three times that amount. So extensive were the works being carried out, that nearly 100,000 men were employed on them in 1874-5. Both banks of the river were maintained in security by unremitting efforts in sundry sections where danger from the force of the current manifested itself. At one spot, while engaged in strengthening a part of the embankment, a squad of the Government labourers were precipitated into the stream by the downfall of a newly-made earthwork, and two soldiers swept away by the flood.

The fatality attending the ravages of the river, has been proverbial from time immemorial; and hence, in conjunction with its erratic course, a superstitious dread regarding it exists to this day; not only by the people who term it "Family Ruin," but by the Government who have named it "China's Sorrow," or grief. A curious instance of this is published in the *Gazette* of February 1875, respecting the supernatural protection to the embankment works, which was afforded in the freshet season by a deified being known as *Wang Tsiang Kün*, signifying the "Heavenly General Wang." It is reported by the sub-prefect of Siang Ho, that at a time when the banks were in imminent peril from the floods, he appeared in visible shape; upon which incense was burnt and prayers were offered, and the danger forthwith passed away. The Governor in his memorial explains that this phantom from Hades was, during life, acting sub-prefect of the district, who "was precipitated into the river and drowned in 1867, through the slip of an embankment. Since then a temple in honour of his memory having been erected with the Imperial sanction, he has on repeated occasions supernaturally interposed for the protection of the works. An application has now been received from the gentry and people of the locality, forwarded through the proper officials, for the bestowal by his Majesty of a title of honour on this divine being." In this instance, and in many others, the request is generally granted, so that the deities who watch over the Yellow River are numerous; and solemn invocations are offered up at their temples on occasions where this supposed influence over its wayward waters has been beneficially exercised.

Notwithstanding these superstitious notions regarding the conservancy of the Whang Ho, the Chinese are eminently a practical people, who follow the old adage, that "God helps those who help themselves;" while the Public Works Department is one of the most efficient in the State. This is shown in the report of Ting Pao-cheng, Governor of Shan-tung, published in August 1875, giving an account of the completion and cost of the gigantic embankment works on the Yellow River, as already mentioned, where the only means of accomplishing the work could be that of calling up large masses of labourers from the different adjoining districts. Accordingly upwards of 100,000 of the peasantry of ten districts in Shan-tung were assembled for the purpose, over whom officials were placed as superintendents, to guard against dishonest or dilatory workmanship.

The heart of the people, moreover, was in the undertaking, the districts in question being those which had been either actually flooded by the river, or were in immediate proximity to the scenes of disaster. The difficulties encountered in the prosecution of the work were immense; and they were aggravated by the necessity of laying foundations in the water, and among ice in December and January. The line of the embankment, about 60 miles in length, was in many places carried over tracts of land across which the river had swept, eating out channels from 25 to 30 feet in depth, or extending to 2000 and 3000 feet in width. These were filled up to the level of the adjacent ground; and dykes of support had to be constructed for the protection of the embankment. The works occupied 18 months in construction, and were satisfactorily executed by the end of June.

Since then no further operations on a large scale have been carried out, but several memorials have appeared, recommending measures for securing the discharge of the Yellow River without obstruction by means of its new embouchure into the Gulf of Pe-che-lee. The channel of the Ta Tsing Ho, which it now occupies, does not average more than one *lee*, or the third of a mile in width; and the embankment of some of the older channels, for the purpose of carrying off the surplus waters of the river, is advocated. Moreover, the dredging of the bar at its mouth is urgently recommended, in order to allow a free channel for navigation at all times of tide. These and other improvements are postponed for want of funds. The current annual expenditure for the conservancy of the river is stated to average upwards of two hundred thousand *taels*, or sixty-seven thousand pounds sterling.

As to the old course of the river there are but few notices in the *Peking Gazette;* and it would appear that most of the inhabitants of the eastern delta of the Whang Ho have migrated to the northern one, especially the junk population, whose occupation was gone when it dried up. Wheat and other kinds of grain now grow in its bed, where formerly the rush of yellow waters was the dread and wonder of that region. Its mighty power for good or evil has been transferred to the north, but from all the data herein given, it would appear to have diminished in volume and velocity. SAMUEL MOSSMAN.

RUSSIAN EXPEDITION TO THE ALAIS AND PAMIR.

M. SEVERTSOF, the learned geologist, known by his exploration of the Tian-Shan mountains in 1864 and 1865, conducted an exploring party from Osh in Ferghana to the Alai and Trans-Alai mountains in the autumn of last year, and promises to give the scientific world some very interesting information when all the materials which have been collected are prepared and collated. He is at present engaged in this labour with some of his fellow-travellers at Osh, making two communications from there, from which the following facts may be gathered:—

M. Severtsof left Tashkend on the 18th (30th) of September, proceeding through Khodjend, Kokand, Marghilan, and Andijan to Osh, and passing thence to Gulcha. From this place the exploring party followed the great Ferghana-Kashgar caravan route, ascending the river which bears in its various parts the names of Kurshab-Gulcha-Su and Taldyk-Su, to a point 10 miles above Sofi-Kurgan, where, from the main route which leads to the Terek-davan or pass, a Kirghiz track branches off to the Shart pass. M. Severtsof took this latter track, crossing the Shart (12,600 feet, in the saddle): another path here runs over a neigbouring height of 13,000 feet. The ascent to this pass is 4000 feet but the winding pathway is 11,000 feet. The incline of the pathway is in most parts 30°; the descent to the south is equally steep, but falls short of a third of a mile. From the southern base of this pass issue the Kokbulak, one of the sources of the Kizyl-Su, or affluent of the Oxus river. Taking its rise at an elevation of 11,500 feet the Kokbulak has a fall of not more than 1000 feet in 10 miles (in its course to the Alai plateau).

The party halted on the 14th (26th) of October at the confluence of the sources of the Kizyl-Su, and proceeded on the next day to the Kizyl-Yart. Some snow had fallen, giving warning of approaching winter, therefore M. Severtsof determined not to push far beyond the Kizyl-Yart. On the 16th (28th) he stood on the Pamir plateau (absolute height 13,420 feet), only 300 feet below the summit of the pass; the Alai Steppe on the north side being 10,100 feet, is thus 3000 feet below the level of the Pamir. The Kizyl-Yart pass is described by M. Severtsof as one of the easiest over the Trans-Alai range, the ascent not being more than 150 feet per verst. A vast plain opens out on the south side of the Kizyl-Yart, which extends eastwards into the valley of the Koksai, terminating 10 miles to the east of the Kizyl-Yart in a narrow gorge at a height of 12,700 feet, which again widens in parts. The Koksai is a river flowing first in an easterly direction, then turning off to the north-east, and falling into the Kashgar daria near the Ulukchat picket post, forcing a passage through a cleft in the Mustaù or eastern continuation of the Trans-Alai mountains.

There is a caravan road skirting the Koksai, which leads from the Kizyl-Yart and from Karakul lake to Kashgar. In avoidance of the gorge or cleft above mentioned, this road leads over a pass in the Mustaù mountains, and M. Severtsof encountered a small caravan from Kashgar which had come over without difficulty. There seems to be little doubt that here is one of the head waters of the Tarim river system of Eastern Turkistan, and although the river was not followed down by any of M. Severtsof's party, yet the information procured this time corroborates that which was obtained in 1876. M. Severtsof gives a series of levels beginning from Khodjend, and dwells on the vegetation in the valleys and plateaus of South Ferghana and of the Alai.

Looking to the east from the Shart pass, M. Severtsof observed at no great distance several sharp peaks, the highest of which by geodesic measurement was found to be 15,534 feet, almost the height of Mont Blanc, but without glaciers or vast snowy plains. There was snow only on the summit, on the 13th (25th) of October, and also in the shady hollows or clefts, which descended to 9000 feet; but the rugged heights of 15,000 feet were completely bare. Narrow streaks of snow, about one fathom wide, occasionally intersected the road up to the Shart, but the sur-

rounding heights, as well as the summit of the pass, were snowless, dry, and dusty. The limit of eternal snow was easy to determine at that season, and M. Severtsof fixes it at over 15,000 feet. According to Fedchenko the snow line in the west is lower.

The entire Alai range was equally free of snow, but compact masses of snow covered the sides of the stupendous Trans-Alai range, descending to the craters in the foreground, *i.e.*, terminating at an elevation of from 13,000 to 14,000 feet. A heavy fall of snow overtook the party on the 20th and 21st of October (O.S.) when they were descending the Kizyl-Yart on their return from the Pamir, through which they had to wade in crossing the Alai plateau, erring about until their Kirghiz guide brought them out of their difficulty.

Although most of the Kirghiz had depastured their flocks retiring into the southern valleys, yet large studs of horses, with a few Kirghiz guarding them, remained to feed as long as possible on the luxuriant grasses of the vast Alai plateau. The grasses on the Alai were exclusively of the *Festuca* species, which retains its succulence later than any other kind. One member of the party found that towards the lower levels of the Alai, at Archa Bulak and further west, the *festuca* gradually gives place to the *Stipa*.

M. Severtsof changes the nomenclature of the mountain chains, giving the name of *Terek Davan* to the section of the Alai range on both sides of the pass of that name, which extends from east of the Kurshab to the Djaga-gart pass; the name of *Alai* to the continuation as far as the sources of the Sokh, Isfara, and Zarafshan, where the range terminates in a mountain knot and a gigantic glacier. From this point there are three other ranges, which he calls the *Turkestan*, *Zarafshan*, and *Hissar* ranges. To the south of this chain is the superior and towering Trans-Alai range, which visibly falls away in the west and abuts on the Hissar range.

M. Severtsof arrives at the general conclusion, from his observations on both sides of the Trans-Alai, and from the triangulations, that the Trans-Alai is not one continuous range, but a complicated system of mountain ranges uniting together, and broken by immense longitudinal valleys and hollows or basins. Two such hollows are observable from the Alai—one towards the east in the direction of Karakul, including the Kizyl-Yart defile and pass; the other to the west, towards the Muk-Su, and south of the sources of the Surkhab, including the defile and pass of Altynyn-dara. These hollows separate three groups of elevation, of which the centre one, 22,300 feet high, which is the height of Kaufmann peak, is the most elevated. M. Fedchenko observed this intersectional break, but M. Severtsof adds to this the longitudinal separations. The highest peaks on either side of the Kizyl-Yart are on two different elevations: the northern elevation, separated from that on the south by a stretch of 10 miles, is the *Gurumdin* elevation, distant 13 miles east from the Kizyl-Yart, presenting a series of peaks from 17,000 to 20,000 feet high, and an offshoot of which separates the sources of the Kizyl-Su of the Oxus river system from the sources of the Koksai, which belongs to the system of the Tarim: so that this Gurumdin mountain system forms one of the principal water-partings of the Pamir. To the west of its intersection, by the Kizyl-Yart defile, the Gurumdin mountains are broken into a chain of detached peaks by the head waters of the Koksai, and these peaks evidently merge with the southern elevation in the vicinity of Kaufmann peak, which is on the southern elevation, about midway between the Kizyl-Yart and the Altynyn-dara defiles, about 27 miles from the first, and 30 miles from the last named. From this highest centre the southern Trans-Alai elevation falls to the east and west to both these defiles, terminating on the west in a declivity in the longitudinal valley of the Ters Agar, and dividing that stream into two branches one flowing to the north into the Kizyl-Su, and the other running south into the Muk-Su. To the east of the Altynyn-dara defile this section of the Trans-Alai forms the water-parting of these headwaters (Muk-Su and Kizyl-Su), of the Surkhab, near Kaufmann peak, somewhat to the east of the latter, and merges with a vast and massive elevation with towering peaks, and covered with eternal snows which stretches from the south and separates the sources of the Koksai, Muk-Su, and Kizyl-Su. To this massive elevation, which has not yet been explored, Mr. Severtsof attaches a primary orographic interest and importance.

The Mustaù rises in the form of a precipitous cape on the elevated plain south of the Kizyl-Yart, with which it is connected by a ridge intersected by the Koksai. Rising to the east the Mustaù forms the wall of the right bank of that river until the latter turns off to the north, from which point it follows the course of the Kashgar-daria ending in a projection in the Djetyshahr plateau almost directly south of Kashgar. The connection of the Mustaù with the more southerly elevations of the Eastern Pamir is partially discernible from the plain of the Upper Koksai, but it has not been explored.

M. Severtsof alludes to a wide and elevated valley, said by the Kirghiz to be a favourite resort of numerous herds of Arkaras and Taks (a species of mountain goat of which two herds were seen), which he presumes is the valley of the Katyn-Kanysh, an affluent of the Koksai, and which must be in his opinion a very extensive hollow.

There is a great deal of interesting and valuable information in M. Severtsof's communications; his levels and heights form an important part of the results of the scientific expedition, although the explorers did not penetrate across the Pamir beyond the Koksai. We are obliged, however, to curtail our brief and we fear very superficial summary.

Besides the *Taks*, the explorers observed several red wolves or (*Canis alpinus*), whose howl resembles that of the jackal. He also found on the northern limits of the Pamir the common wolf, foxes, hares, marmots (*Lagomys rutilus nob*), and numerous field mice (*Arvicola*), besides 14 different kinds of birds of passage and others.

M. Spassi determined the heights of 10 peaks on both sides of the Alai plateau, and altogether 15 inaccessible points geodesically, besides numerous others barometrically, with mercury; while M. Severtsof made his with a Goldsmidt's aneroid. M. Schwartz determined 7 new magnetic points, being the first to make magnetic observations on the Pamir.

M. Severtsof occupied himself during this expedition with geognostics and zoology besides barometrical

measurements and the formation of a natural history collection.

The party returned to Osh, by way of the Katyn-Art and Taldyk passes. M. Severtsof remains at Osh elaborating the results of his expedition, while the other members proceeded to Tashkend and Orenburg.

ROBERT MICHELL.

THE DUTCH ARCTIC EXPEDITION.

"OUR POLAR SHIP."

THE following article is translated from one in the *Eigen Haard* of Haarlem. (No. 18, 1878):—

The 'Willem Barentz!' Every Dutchman may look with pride on this beautiful schooner, just finished by our countryman, Schipperus. Thanks to the gifts and subscriptions of all classes of our countrymen, our tricolour will again, after a lapse of one hundred years, float on the seas and along the coasts so familiar to our ancestors. The ancient tradition of our polar voyages was nearly forgotten, but the beautiful poem of Tollens had preserved the memory of the voyages of Barentz and Heemskerk, while the voyages of discovery of so many other dauntless navigators had been thrown into the background. The polar voyages of Jakob May, with the ship 'De Gonden Kat'; of Jakob de Gouwenaar, with the ship 'De Orangien boom' of Enkhuizen; of Peter Jansz, with the ship 'De Viar Heemskinderen; of Van Aart Havelaar, with the ship 'De Hazewind,' were as unknown as those of Jeunis Ijs, Cornelis Roule, Willem de Vlamingh, and many other brave ice voyagers. It does indeed seem strange that a country that formerly fitted out yearly more than 100 whalers should at present know so little of their polar voyages.

Our whale fishery was flourishing when the French war ruined all our merchant shipping, and even later, in 1813, there were occasional voyages to the north. The more profitable and agreeable voyages to our colonies undermined any wish to seek the old treasures of the bleak, inhospitable north; and it seemed that as the race of hardy ice captains died out, so with them died all interest in the north seas, that had been the field of exercise and cradle of our sailors, who knew so well how to uphold the honour of our country. The old traditional names given by Dutch discoverers to lands and seas gradually disappeared from maps and were replaced by others; the burial places of our ice voyagers were only visited by strangers; and the Dutch flag that during the first winters spent by Europeans in the polar regions had fluttered over the hut of Barentz was brought back to us by a stranger; and this last wound has been felt deeply in Holland. Men of consideration placed themselves at the head of a movement that was felt throughout the whole of the land, and showed what a strong feeling still prevailed among our people for their old traditions. The best bible for a people is their own history, and happy are those who can read it, and draw from it fresh strength. And we therefore rejoice that the 'Willem Barentz' steered to the north. Her voyage must be regarded as the first step to restore our seamen to their place in the van of scientific voyages of discovery, a right that they have so long abandoned to strangers.

As far as is possible the 'Willem Barentz' is fitted out for her task, though it is to be regretted that there was not sufficient money to build a steamer for this purpose; but the scientific polar voyages of the Swedes, Norwegians, and Germans all show that great results may be obtained with small sailing ships. That the 'Willem Barentz' is only of 80 tons must be considered as one of her greatest advantages, for in seas covered with ice small ships have great advantage, as they can work through small openings in the ice, can in calms be towed, and can run into any bays or indentations in the coast. And when one considers that the voyage is to form ice navigators, one should rejoice that the 'Willem Barentz' is a sailing and not a steam-ship. Lieutenant Payer, who has spent three winters and five summers in the Arctic regions, says that far more experience and knowledge is to be learnt in a sailing ship than in a steamer. Much depends on chance progress, depending on wind and weather, and as the vessel is not manned by sailors experienced in these icy seas, there will, in their first voyage, be many and serious difficulties to encounter. Neither money nor trouble have been spared to make the vessel as strong and solid as possible. In the whole ship care has been taken to make the timbers support each other as much as possible, so if the ship is nipped by ice, the whole may resist the pressure as one mass. But the great strength of the 'Willem Barentz' consists in her wedge form under the water, so that she will be more easily pressed out of the water by ice than crushed. The bows are very sharp, so that the masses of ice instead of keeping themselves before the bow will glide along it, and the prow has iron plates, so if the ship strikes an ice field she will be raised out of the water on to the ice.

On the 1st of December 1877, at the wharf of Messrs. Meursing and Huygens at Amsterdam, the keel of 'Willem Barentz' was laid. The work was continued through the whole of the winter every day until 9 o'clock at night by lamplight, and, thanks to the care of Herr Huygens, she was safely launched on the 6th of April. The ship is 78½ feet in length, 19½ feet beam, and 10 feet deep. A between decks is brought 4½ feet under the upper deck, and serves to strengthen the vessel, and also as lodging for the crew; while the whole ship by two water-tight compartments is divided into three parts, each independent of one another, in case of a leak. The outer skin is of oak, and covered with planking called doubling; round the bows are iron plates fastened with ten iron bands. Inboard the 'Willem Barentz' is strengthened by cross beams and iron plates. The stern is vertical to the keel to facilitate the unshipping and shipping of the rudder; it is capped with very thick wood, and the bands are twice as strong as those in the generality of ships. She draws 8 feet, and is covered with Peacock's preparation to prevent the growth of weed. The 'Willem Barentz' is a two-masted schooner, she has two strong lower masts, and two low top masts. She has spare sails, and a spare rudder on board. On deck, between the masts, are two strong boats; she carries about 40 tons of drinking water, and has 18 months' provisions

The victualling and fitting out of the 'Willem Barentz' was undertaken by the Minister of Marine, and Government stores were used. Under the active and willing care of Overseer Huysman van Dueren, Magazine Master of the Royal Wharf at Amsterdam, all the provisions were carefully examined and packed. In clothing every advantage was taken of the experience already gained by foreign expeditions. In the after part of the ship are the officers' cabins and galley, and a small place where ropes can be kept. The water tanks are abaft the main mast; the powder-room and spirit-room are under the officers' cabins, and the rest of the hold under the between decks is stowed with coal. On the upper deck, abaft the main mast, there is a steam winch, made especially for this expedition by the engineer, Mijussen, of Amsterdam, to aid in drawing in the line after deep-sea soundings or the dredge net.

The crew consists of fourteen, namely, three officers, one zoologist, one doctor, one photographer, and eight sailors. All excepting the photographer are Dutch. The command of the expedition has been given to A. de Bruyne, lieutenant of the first class; under him are two lieutenants of the second class, L. R. Koolemans Beynen and H. M. Speelman, the last undertaking magnetic observations; Dr. Sluiter is the naturalist; and the Englishman, W. J. A. Grant is the photographer. He is a graduate of Oxford, and served in the same capacity with Sir Allen Young in 1876. The boatswain, the carpenter and cook belong to the Royal Navy; the rest of the crew consist of two sailors from the pilot service at Flushing, two fishermen from Marken, and a man from Nieudiep.

Fitted out with the greatest foresight and care, the 'Willem Barentz' sailed on the 5th of May. One must not expect too much from the first Dutch polar voyage of modern days, in the way of great discoveries. The voyage must be regarded as an experimental summer trip to the seas of Spitzbergen or Novaya Zemlya, in which experience will be gained, and many important observations made. The object of the first voyage of the 'Willem Barentz' is to form experienced officers and men in ice navigation, taking at the same time as many scientific observations as possible. The Minister of Marine has supplied the expedition with the best and newest instruments, so that much may be expected from a cruise of five or six months. Important observations may be made of the minute marine fauna of those seas.

The question of what is the object of this voyage can best be answered by giving an account of the expected results.

1. Deep-sea soundings, and observations of thetemperature of the sea.

2. Observations as to the qualities of salt and temperature at different depths.

3. Observations of the fauna and flora.

4. Observations on the strength and direction of the currents.

5. As many observations as possible in meteorology and magnetism.

6. The determination of places by astronomical observations.

(*a*) Also to place white marble memorial stones, with inscriptions, as a simple mark of reverence to our dauntless forefathers.

(*b*) To make geographical observations on the land and trend of the coast lines.

(*c*) To form seamen who may later, if necessary, be entrusted with a scientific station.

(*d*) To obtain knowledge of the condition of pack ice in the seas first visited by Barentz, as far as is possible in a short summer trip, so as to prepare for scientific stations or Siberian trade voyages.

The expedition left Ijmuiden on the 5th of May, and may be expected to return in October. Its course will first be directed to Jan Mayen island, and from thence the edge of the ice will be visited, and scientific investigation in the Spitzbergen sea begun. Following the edge of the west ice, Amsterdam island, the north-west point of Spitzbergen will be reached, and there a few days rest will be taken. Smeerenburg, our old and now ruined station for boiling oil, will be visited, the fallen grave stones in the seaman's burial place replaced, and a white marble memorial stone erected, with the following inscription:—

IN MEMORY,
SPITZBERGEN OR NIEULAND,
Discovered
79° 30′ N. latitude,
BY THE DUTCH.
Smeerenburg, on Amsterdam Island in the Dutch Bay,
Head-quarters of the Netherlands North Company.
Here wintered 1633-1634,
JACOB SEEGERSY AND 6 OTHERS.
Here wintered and died, 1634-1635,
ANDRIES JANSZ, OF MIDDLEBURG, AND 6 OTHERS.

After filling up with coal expected to be found in the coal mines of Advent bay in Ijs fiord, observations for temperature at various depths will continue to be taken until the 15th of July, when probably the expedition will reach Bearen island. These observations will be of double value, as the Swedes have visited this same place, and their observations can control ours. Then the Novaya Zemlya or Barentz sea will be visited for the first time by scientific voyagers, and in September the 'Willem Barentz' will return home. There is no school for making daring seamen to be compared with a scientific cruise in the polar seas; but as a great part of our countrymen have a dread of these voyages, it is advisable that our first polar trip should not depress their courage and spirits by remaining too long absent; and the commander has instructions to avoid if possible wintering in the ice. If the Barentz sea is to be again the exercising ground for our seamen, we must be careful that our first trip is ruled by calm courage and prudence. In the month of October the expedition may be expected back at Ijmuiden with, we trust, a harvest of scientific knowledge.

TOPOGRAPHICAL AND REVENUE SURVEYS OF INDIA, 1876-77.

RETIREMENT OF MAJOR-GENERAL THUILLIER.

DURING the working season of 1876-77 there were seven topographical surveying parties at work, besides two in Mysore; but, owing to the short-sighted policy of the Government, the parties have since been reduced to five, two thoroughly organised and efficient parties having been broken up to save a few rupees, at a sacrifice of many admirably-trained men lost to the department, involving injury to the public service and eventual

waste. The diminution of the trained machinery by reductions of parties, at such a critical period of the progress of the great national work on which the Survey Departments have been so long engaged, is as much a mistake financially as it must be injurious to the crying wants and necessities of administrators of the Indian provinces, who must have the surveys they ask for sooner or later. The reduction is alike detrimental to the real interests of the Government, and to the prospects of old and zealous servants, who have freely sacrificed their health in the arduous and perilous duties of the surveys. In 1876-77, however, the work was pushed forward by a sufficient staff, securing an out-turn of 18,909 square miles topographically surveyed, 1749 square miles cadastrally surveyed, and 10,794 for revenue and village maps. From 1845 to 1877 there have been 493,293 square miles surveyed for revenue purposes in Bengal, Assam, Oudh, the North-West and Central Provinces, the Punjab, Rajputana, Sind, and Bombay; beside 1281 square miles cadastrally surveyed in the North-West Provinces, on a scale of 32 and 16 inches to the mile, from 1871 to 1877. Since 1860 the topographical surveys have been extended over 291,554 square miles.

The districts in which topographical surveys were making progress in 1876-77 were Gwalior and Central India, under Captain Strahan; Khandesh and the Bombay Native States, under Mr. Horst; Bustar, under Captain Holdich; the north-eastern division of the Central Provinces, under Colonel Depree; Bhopal and Malwa, under Captain Wilmer; and the Khasi Garo and Naga hills, under Major Badgley.

The map of the Daphla Hills and the course of the Subansiri river, by Major Godwin Austen, was completed. This distinguished surveyor, whose services were lost to the department by his retirement on June 12th, 1877, believes that the east branch of the Subansiri, near 94° east longitude, is the great river of Tibet, hitherto supposed to be the Dihong.

The Mysore topographical survey is under Captain Strahan and Major Thuillier, who have been at work in the Nundydroog and Nagar districts.

General Thuillier retired from the post of Surveyor General in the end of the year 1877; and was succeeded by Colonel Walker, who unites the two posts of Surveyor General and Superintendent of the Great Trigonometrical Survey in one appointment.

General Henry E. Landor Thuillier, C.S.I., F.R.S., entered the Bengal Artillery in 1832, and joined the surveying service in 1836. He was engaged on the Ganjam and Orissa Surveys, from 1839 to 1842, and afterwards surveyed Silhet and Cachar. In 1847, he succeeded Major Wroughton in the charge of the revenue surveys, and in 1851 was published his *Manual of Surveying for India*, which has been, for the last quarter of a century, the means of inculcating strict professional principles and vigorous procedure in the revenue settlement department. A second edition appeared in 1855, and a third in 1875. On the retirement of Sir Andrew Waugh, the two offices of Surveyor General and Superintendent of the Great Trigonometrical Survey were separated, and General Thuillier was appointed Surveyor-General of India on the 12th of March 1861. He had been Sir Andrew Waugh's Deputy, in charge of the office at Calcutta, from 1847 to 1861, and during those fifteen years the general usefulness of the surveying operations had been increased a hundredfold. During his Surveyor Generalship, covering a period of sixteen more years, his activity has never flagged. His energy and talent for organization have been devoted alike to improving the system of surveying in the field, and making its results more readily accessible to the public. In his time the use of photo-zincography was introduced into the office at Calcutta, and the out-turn of work by this means, already enormous, is yearly increasing. By photo-zincography the results of the surveys are immediately made available for general use. In 1876 as many as 156,969 copies of maps and plans were thus produced. In 1869 General Thuillier arranged that the remaining sheets of the Indian Atlas should be engraved at Calcutta, having engaged a staff of engravers in England, and this branch of the department has also been very successful.

The public service owes a debt of gratitude to General Thuillier for his devotion and zeal during forty-five years, and for the great and lasting results of his able administration. We believe that so active a public servant will not be able to rest even after such long and severe service, and that geography will yet derive much assistance from his experienced labours; but most certainly he has earned some rest, and, in welcoming him back to England, we sincerely wish him many more years of health and happiness.

Reviews.

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ROUND ABOUT THE CARPATHIANS.*

Round about the Carpathians is an extremely pleasantly-written volume, and gives a large amount of well-digested information about Transylvania. The author, leaving Buda-Pest in June 1875, proceeded by steamer down the Danube to Basiash, which, as the terminus of the railway, is a place fast growing into importance. From that point Mr. Crosse abandoned railways and steamers, and adopted the excellent plan of going his "rounds" on horseback. By this independent method of travelling he enjoyed exceptional advantages in becoming acquainted with the characters of the mixed populations and the varied scenery of Transylvania. The fine views of the Southern Carpathians are fully appreciated and well described. The author says:—

"The sides of this valley are clothed with dense forests, with broken cliffs obtruding in places. The height of the Carpathians in this part of the range must not be taken as a gauge of the scenery, which quite equals in grandeur the higher Alps in many parts of Switzerland and the Tyrol. Comparisons are dangerous, for the lovers of Switzerland will silence me with glaciers and eternal snows; these advantages I must concede, still contending, however, for the extreme beauty and wildness of the Southern Carpathians. The characteristics of the scenery are due to the broken forms of the crystalline rocks, the singular occurrence of sharp limestone ridges, and the deep forest-clad valleys, traversed by mountain torrents, which everywhere diversify the scene."

In addition to general descriptions of the country, Mr. Crosse enters briefly but instructively into its geological formation, and his remarks on the mineral wealth of Transylvania will prove extremely interesting to all those who are concerned in the material prosperity of Hungary. Probably no other part of Europe of the same area possesses such mineral wealth as Transylvania. At Petrosèny one of the seams of coal is 90 feet in thickness. The production of coal seems, however, to be hampered by administrative abuses, which the author thus refers to:—

"While at Petrosèny, I heard great complaints against the Government for selling coal at such a low price that they must actually work at a loss. The Kronstäder Verein say they are prevented in this way from making their fair profits, as they are obliged to sell down to the others. It would appear to be a

* *Round about the Carpathians.* By Andrew F. Crosse, F.C.S. (Edinburgh and London: Blackwood and Sons, 1878.)

suicidal policy for the pockets of the taxpayers to be mulcted for the sake of securing a prospective monopoly and the ruin of a private enterprise."

To the general reader the most interesting portions of the volume will be the accounts the author gives of the people amongst whom he travelled. Whilst doing justice to the good points of the Hungarian character, such as patriotism, hospitality, and bravery, he does not gloss over or conceal their faults of pride and recklessness. Magyar intolerance of German is well exemplified by the following passage:—

"It happened to me once that I entered an inn in a Hungarian town, and addressing the waiter, I gave my orders in German, whereupon an elderly gentleman turned sharply upon me, saying—also in German, observe—'It is the custom to speak Hungarian here.' 'I am not acquainted with the language, sir,' I replied. 'German is not to be spoken here—Hungarian or nothing,' he retorted. I simply turned on my heel with a gesture of impatience. It was rather too much for any old fellow, however venerable and patriotic, to condemn me to silence and starvation because I could not speak the national lingo, so in the irritation of the moment I rapped out an English expletive, meant as an aside. Enough! No sooner did the testy old gentleman hear the familiar sound, invariably associated with the travelling Britisher in old days, than he turned to me with the utmost urbanity, saying in French, 'Pardon a thousand times, I thought you were a German from the fluency of your speech; I had no idea you were an Englishman. Why did you not tell me at once? What orders shall I give for you? How can I help you?'"

Of the Wallachians, the author is not inclined to speak so favourably, probably from having been brought more into contact with the antagonistic Magyars, but when we consider the good front that the Roumanians have displayed at Plevna and on other occasions during the late Russo-Turkish War, we cannot coincide altogether with the views of Mr. Crosse:—

"To meet a Roumanian possessed even of the first rudiment of education is an exception to the rule: even their priests are deplorably ignorant; but when we find them in receipt of such a miserable stipend as 100 florins, indeed in some cases 30 florins a-year, it speaks for itself that they belong to the poorest class. The Wallacks lead their lives outside the pale of civilisation; they are without the wants and desires of a settled life. Very naturally the manumission of the serfs in 1848 found them utterly unprepared for their political freedom. Neither by nature nor by tradition are they law-respecting; in fact, they are very much the reverse."

Along with other writers on Transylvania, Mr. Crosse refers to the ruthless destruction by fire of the beautiful woods that adorn the slopes of the southern Carpathians. At present there is an ample supply of forest, but the time must come when this reckless waste by the Wallachians will cause the country at large to suffer.

Like most young travellers who go for the first time amongst rough people he is constantly suspecting them of designs against his person, and brandishing his revolver rather too frequently.

At page 150 he commits a slight error by misquoting Mr. Danford in "The Ibis," with reference to the size of the trout in the Sebes, also in the volume referred to, which should be Vol. V. Series III. In another quotation from the same source, the names given Chamois-Eagle, Fisher-Eagle, King-Eagle, will look curious to the ornithological reader: in so quoting, the translation of the Hungarian names has been mistaken for the ordinary English ones. There are a few mistakes in names, such as *Ursa*, given as Wallach for bear, instead of *Ursu*, the proper word (*v.* page 123).

On the whole Mr. Crosse must be congratulated on having produced a book which gives a truthful and lively description of the populations and scenery of Transylvania, and which forms a very worthy companion to Boner's *Transylvania, its People and its Products.*

BURMA—PAST AND PRESENT.*

IN these two handsome volumes Lieut.-General Fytche weaves together his autobiography and an exhaustive account of Burma, in the British portion of which he was employed for 30 years, and held the office of Chief Commissioner from 1867 to 1871. It was during his administration, and under his direction, that Major (now Lieut.-Col.) Sladen undertook his expedition to Bhamo and Momien.

On the eve of publication he was inclined to regret that he had not given his information in a more abstract form; in our opinion he may be satisfied with having communicated it in an agreeable and readable manner; nor are we disposed to quarrel with him for telling us about himself, as he does it so pleasantly and naturally, and had he chosen a more severe style we should have lost some characteristic and interesting anecdotes. His readers will see that though he lived so long among the votaries to Buddhism he has no fancy for the doctrine of *nirvana*, or self-annihilation. We are not sure, however, that a spice of *self* is not favourable, as a certain amount of ambition certainly is, to the production of that description of character to which we owe the acquisition and preservation of our great Indian Empire.

The General claims as his ancestor Ralph Fitch, who in the reign of Elizabeth travelled through India and penetrated as far as Burma, and whose quaint and concise narrative may be read in Purchas and Pinkerton. Another ancestor (in what degree we are not told) was William Fytche, President of Fort William, who died in 1752 at the early age of 35, and of whom an engraving from a posthumous but very striking portrait by Hogarth is given.

The account of Burma begins with an historical sketch compiled from the ancient Burmese chronicles and old Portuguese historians. This history, up to the time of the first collision with the British power, is a round of wars and revolts, of treacheries and murders repulsive in the extreme. The only points of any interest in it are the political intrigues of Spanish and Portuguese adventurers and the three invasions of Burma by the Chinese. The government is an absolute despotism; there is no hereditary rank or title in the kingdom; the only check on the tyranny of the king is the fear of insurrection. When set side by side with the enlightened government of the English, the natives were not slow to discover the advantages of the latter. Ever since the first Burmese war all the surrounding populations have immigrated in large numbers into the British provinces.

"In 1826 the provinces of Arakan and Tenasserim were annexed to the British dominions, whilst Pegu remained under

* *Burma—Past and Present, with Personal Reminiscences of the Country*, by Lieut.-General Albert Fytche, C.S.I., late Chief Commissioner of British Burma, and Agent to the Viceroy and Governor General of India. In 2 vols., with Illustrations, (London: C. Kegan Paul & Co.) 1878.

Burmese administration. The population of Arakan amounted at that period to about 100,000 souls, and that of Tenasserim to about 70,000. In 1855 the population of Arakan had increased to more than 350,000; whilst that of Tenasserim had increased to more than 210,000. Within 30 years the populations of both provinces had trebled under British rule. This vast increase was due to immigration from provinces under Burmese government, and notably from Pegu."

"Shortly before the completion of this period, Pegu was wrested from the Burmese Government, and the interposition of the new British province almost immediately caused emigration to the two older provinces to subside; thus proving that the cause which had given rise to it had been removed. The tide of life flowed no longer from Pegu when a Government which respected the rights of individuals had been established; but commenced to flow into it from Upper Burma in a continuous stream, and in a very short time more than recouped it for the multitude who had abandoned that province for Arakan and Tenasserim. In 1855 the population of Pegu was about 700,000; in 1865 it had swelled to 1,400,000; in 1875 it was 1,750,187."

Our author adds that the Burmese dynasty has always possesed a strong hold on the reverence and imaginations of the people, and he justly argues that—

"The desertion of their own sovereign and country by these masses, and their voluntarily placing themselves under an alien rule, coupled with the vast increase of prosperity in every shape of the portion of Burma which has become British, must, at least, as far as British Burma is concerned, unequivocally convince the minutest admirer of native rule and institutions of the excellence of British over native rule."

The book contains a good popular account of Buddhism, as professed by the Southern Buddhists. It has been supposed by some travellers in Burma, from seeing many religious buildings going to decay, that Buddhism was declining. This, the General tells us, is not the case. A much larger amount of honour and merit attaches to the foundation of new temples and monasteries than to the repairing of old ones: hence many sacred buildings go to ruin at the same time that new ones are erected.

The many points of similarity between the Buddhist and the Roman Catholic religions have been dwelt upon by numerous writers, and they struck General Fytche no less than they did Messrs. Huc and Gabet, though among the Southern Buddhists they are not perhaps so startling as among the followers of the less pure religion of Tibet. We have never yet seen a sufficiently satisfactory explanation of these strange points of resemblance. The General speaks of them as superficial, and certainly, as far as forms, ceremonies, and Church government go, they may be so considered. But this resemblance goes deeper: the ethics of the Buddhists have a remarkable analogy with those of the Christian Church, and it has been remarked that in reading the life of Gautama it is impossible not to be reminded of many circumstances in the life of our Lord.

The Buddhists may justly claim superiority over the Christians on two heads. They have never propagated their religion by fire or sword. And they have been the first to establish a general system of education. The account given by the General of the national schools of Burma is most interesting. They originated in the monasteries, but have extended beyond, the lay, or, as they are called, *House schools* being free from some of the disabilities that are attached to the religious seminaries, notably the exclusion of female pupils. "Owing to these two classes of indigenous schools, there is scarcely a man in Burma who cannot read, write, and cipher. . . . . The discipline is strict, and there is no sparing of the rod when such is necessary." At the suggestion of Sir Arthur Phayre, these schools have been made the basis of a more extended system of national education, the success of which seems to be assured.

We are very far from having noticed all the topics of interest in General Fytche's work: our readers will easily light on many more. His book has the great merit of being written by one who thoroughly understands what he is writing about; it is well got up, and is supplied with an excellent map and many illustrations.

PARIS UNIVERSAL EXHIBITION OF 1878.*

THE attentive reader of this handbook will scarce fail to regret that so exhaustive and able an exposition of the history of Indian trade and Indian art should be presented to the world in a form which is necessarily more or less ephemeral. The careful historical and artistic researches which Dr. Birdwood has entered upon, and the thought with which he has marshalled his facts into a serried phalanx of arguments all tending to shew the vital political importance of the Euphrates valley route to India deserves a much more careful examination than is wont to be bestowed on handbooks. The main contention of the author here is that the States and Empires along the *littus Arianum* rose and fell in prosperity according as they gained or lost the trade of the East, and this theory is argued with considerable dialectical skill, though all may not find it possible to agree in the conclusions that a great overland trade must spring up between Russia and India, with an emporium at Merv, or that the commerce of the future between India and Europe will gravitate, as sure as the fall of a plummet, to the line between Banda Abbas and the Caspian.

A chapter on the master handicrafts of India will abundantly repay perusal. It notices, with truth, how primitive in one respect is the civilisation of India, where everything is hand-wrought, and therefore more or less a work of art, and justly protests against the "improvement" of such a people in the practice of their own arts. We heartily concur in the spirit of such a sentiment, though, of course, everything must depend on the manner and extent of the improvement. No lover of art could wish to see "improved shawl patterns from Paris" thrust on the Cashmere weavers, whose former handiwork and designs have achieved such deserved world-wide reputation. On the other hand, education may, if rightly directed, eliminate much that is lacking in purity of thought, and much that is grotesque, from Indian art. The author's obvious dread is the general introduction of machinery into India, and the consequent sacrifice of decorative art, as has been the case in the United States of America and elsewhere. It must not be forgotten, however, that the extraordinary abundance of cheap labour in India will always form a baf to the wholesale supersession of manual labour which we see in more highly civilised countries.

The following description of the traditional handicrafts of a Deccan village is so picturesque that we cannot forbear reproducing it:—

"Outside the entrance, on an exposed rise of ground, the potter sits by his wheel moulding the swift revolving clay by the natural curves of his hands. At the back of the houses, which form the low irregular street, there are two or three looms at work, in blue, and scarlet and gold, the frames hung between the acacia trees, the

* *Handbook to the British Indian Section of the Paris Universal Exhibition of* 1878. By George C. M. Birdwood, C.S.I., M.D. Edin. (London, 1878.)

yellow flowers of which drop fast on the webs as they are being woven. In the street the brass and copper smiths are hammering away at their pots and pans; and further down, in the verandah of the rich man's house, is the jeweller working rupees or gold mohrs into fair jewellery, gold and silver earrings, and round tires like the moon, bracelets and tablets and nose rings, and tinkling ornaments for the feet, taking his designs from the fruits and flowers around him, or from the traditional forms represented in the paintings and carvings of the great temple, which rises over the grove of mangoes and palms at the end of the street above the lotus-covered village tank. Now it is half-past three or four in the afternoon, and the whole street is lighted up by the moving robes of the women going down to draw water from the tank, each with two or three water jars on her head; and so going and returning in single file, the scene glows like Titian's canvas, and moves the stately procession of the Panathenaic frieze. Later the men drive in the milk-white kine from the moaning jungle, the looms are folded up, the coppersmiths are silent, the elders gather in the gate, the lights begin to glimmer in the fast-falling darkness, and the feasting and the music begin, and the songs sung late into the night from the Ramayana or Mahabharata; and the next morning with sunrise, after their simple ablutions and adorations performed in the open air before their houses, the same day begins again. This is the daily life going on all over Western India in the village communities of the Deccan, among a people happy in their simple manners and frugal way of life, and in the culture derived from the grand epics of a religion in which they live and move and have their daily being, and in which the highest expression of their literature, art, and civilisation has been stereotyped for 2000 years."

The description of two such specialties as Indian arms and jewellery is conceived in the author's happiest style, and almost compensates one for the absence of the objects referred to. We are next introduced to the interior of a wealthy native's residence in Bombay, and so gain an acquaintance with the household decoration and art furniture prevalent in that and other Presidencies of India. Woven fabrics, such as muslins, bleached and unbleached calicoes, silks, brocades, &c., appear to be well represented in the Exhibition, and the history of their manufacture is treated in most interesting fashion in the handbook. We should have liked to have had rather more information about one of India's most beautiful products—the famous shawls of Cashmere, the finer qualities of which fetch such enormous prices.

We have had occasional grumbles in England from trades who have imagined that their interests have been injured by the competition of gaol-industries; but we regret to see that in India carpet manufacturers have better cause of complaint than the English mat and brush makers. Dr. Birdwood informs us that the Indian Government, in one of its ruinous fits of small economies, hit upon the plan of using their gaols for the supply of the now lucrative trade in carpets, and that by underselling the honest caste weavers, the latter have been impoverished and ruined, and their beautiful and historical art handed over to the Thugs, who have simply strangled it.

One of the most suggestive parts of Dr. Birdwood's book is the concluding chapter, wherein he has developed a very consistent and ingenious theory regarding the "knop and flower" decoration. This cannot be well understood without the aid of the woodcuts illustrating it, but it may suffice for a review to explain that he traces a distinct similitude between the knop and flower as depicted on Sind pottery and the same on the palace of Kouyunjik, which he regards as a further proof of the remarkable affinity between Assyrian and Indian decorative art—an affinity probably due to the fact that the earliest civilisation of India before the Aryan invasion, was Turanian, as well as the pre-Semitic civilisation of Babylonia and Chaldæa. The development of this knop and flower pattern the author further traces in the Greek "honeysuckle and palmette" scroll, the "tongue and dart" and "egg and tongue," the various modifications of which are analysed with considerable perspicuity. We take our leave of this most interesting handbook with the feeling that its production is a credit to the author, and we trust that the favour with which it has been received will encourage him to issue it in a more permanent form.

THE ROYAL NAVY LIST. Containing Dates of all Commissions, and Statement of the War and Meritorious Services, &c., of the Officers of the Royal Navy and Royal Marines on the Active and Retired Lists. By *C. E. Warren, R.N.*, and *Lieut.-Colonel F. Lean, R.M.L.I.* (April 1878.)

THIS undertaking deserves all possible encouragement, as it supplies a great want for the Navy, which has long been felt. *The Royal Navy List* is on the same principle as Hart's *Army List*, and it contains much very useful information which could not be obtained previous to its publication, without great difficulty. The special points in this new Navy List are the dates of all commissions of each officer, a most important piece of information; the war and meritorious services of officers, which are given in no other book of reference; the causes of awards, with official details of the deeds of gallantry for which the Victoria Cross, the Humane Society's and Albert Medals &c., have been given; causes of special promotions; and civil appointments held by officers, especially in the retired list. We trust that the editors will be promptly supplied with additional information, so as to make their most useful section on war and meritorious services complete.

Log Book.

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The President of the Royal Geographical Society.—The Earl of Dufferin, who will return from Canada in the course of the summer, has accepted the post of President of the Royal Geographical Society for the year 1877-78. The Vice Presidents will be Sir Henry Rawlinson, Sir Rutherford Alcock, Lord Cottesloe and Sir Harry Verney.

Professor Nordenskiold's Arctic Expedition.—Signor G. Bove, the Italian officer attached to Professor Nordenskiold's expedition to the Siberian Polar Sea, reports that he has been most graciously received at Stockholm by His Majesty King Oscar, who showed great interest in Arctic matters, and in the Italian doings in Central Africa. Two vessels are engaged for the expedition—the 'Vega' (see our number for November 1877, p. 297) and the 'Lena,' a steel-clad steamer of about 500 tons, commanded by Captain Johannesen, who has already navigated the Sea of Kara. This latter vessel is the property of M. Siberiakoff, and it is proposed that the two vessels shall voyage in company as far as the delta of the Lena river, and that the 'Lena' shall then ascend the river to Yakutsk. But if, by any mischance, the 'Vega' should ground on the banks northward of the Katanga and the Kolyma, the 'Lena' will endeavour to proceed on to Behring's Straits.

Hydrographic Surveys in North Eastern Asia.—Lieutenant Onasetvich has recently communicated to the Imperial Russian Geographical Society an account of his hydrographical labours in the seas off the eastern coast of Siberia during the years 1875-76. Between January and October of the former year he was engaged mainly in astronomical work, and for the en-

suing twelve months in taking soundings. He executed several surveys in the vicinity of Vladivostock Bay, and connected that town, by means of chronometric measurements, with Hakodadi, Yedo, Hong Kong, and intermediate positions. He then made an excursion in the clipper 'Vsadnik' to the Straits of Behring and the Arctic Ocean, in the course of which he determined astronomically the position of Petropaulovsk and other points on the N.E. coast of Asia, and surveyed several parts of the coasts, including that portion of the Arctic Ocean between Behring Straits and 70° N. latitude.

The following positions determined by Lieutenant Onasetvich will prove of great use in the construction of future maps:—

	Lat. N.			Long. E. of Greenwich.				
Vladivostock	43°	6′	51″4	8h.	47m.	33s.	31	(in time)
Kirpitchin Zavod Bay	43	8	24	8	47	37	75	,,
Holy Trinity Bay ...	42	34	57	8	44	36	72	,,
Korsakov Port	46	38	52	9	31	0	26	,,
Jijiginska Bay	61	47	54	10	41	37	66	,,
Jamska Bay	59	34	10	10	17	33	16	,,
Tawiska Bay	59	31	52	9	56	45	57	,,
Aian	56	27	27	9	12	45	15	,,
Feklistov Island ...	54	56	1	9	7	6	00	,,
Mamga River	54	24	5	9	7	11	13	,,
Saint Olga Bay ...	43	44	24					
Saint Gabriel Bay ...	62	23	30	179°	3′	8″	(in distance)	
Holy Cross Bay ...	65	27	54	181	14	5	,,	
Providence Bay ...	64	21	55	186	36	1	,,	
East Cape (S.E. extremity)				190	7	0	,,	
Cape Serdtse Kamen	67	3	1	188	27	7	,,	

Explorations in New Guinea by Signor L. M. D'Albertis.—From the diary of Signor D'Albertis, published in the *Sydney Morning Herald* of the 8th of March last, we learn that he has recently returned to Sydney after one of the most adventurous and dangerous voyages that had ever been made in New Guinea.

For the purpose of exploring the Fly River the New South Wales Government had placed at his disposal the steamer 'Neva,' in which he left Somerset in May of last year under rather unfavourable auspices. He had been particularly unfortunate in the selection of his crew, who proved refractory and mutinous; and he also met with great hostility from the natives, on several occasions being obliged to have recourse to arms in self defence. The results of the expedition add little to our geographical knowledge, and consist chiefly of additions to his natural history collections. We understand it is not the intention of Signor D'Albertis to make any further attempt at exploration in this region, the climate having been found exceedingly trying.

Captain R. Burton's recent Explorations in the Land of Midian.—With the object of examining into the mineral wealth of the Land of Midian, Capt. Burton left Suez in December 1877, returning in April last. The results of these four months' travelling, in which upwards of 2500 miles were traversed, add very considerably to science generally. Besides maps and plans of the whole country, including 22 ruined cities, the expedition returned with 25 tons of ores of gold, silver, copper, tin and lead; several cases of ethnological and anthropological collections; numerous sketches in oil and water-colours, and photographs of the chief ruins. He also discovered three deposits of sulphur, three turquoise mines, and immense masses of gypsum, saltpetre, and rock salt; and he proposes at once to take measures for working these promising mines. Specimens of ores are to be sent to London and Paris, and the rest analysed in Cairo, while the various curiosities after being exhibited at Cairo will be forwarded to the Paris Exhibition.

Expedition from Senegal to Timbuktu and Algiers.—M. Paul Solleilet, who endeavoured a few years ago to open up a commercial route between Algiers and Senegal, has started from Bordeaux on a second expedition with the like object for Saint Louis, in Senegal, from which port he intends to journey into the interior to Timbuktu, from thence to In-Salah, and from In-Salah to Algiers. M. Soleillet is an energetic man, accustomed to the climate of the Sahara desert, and in his former journey he succeeded in gaining the respect and liking of the Arabs and Berbers. It appears very likely that he will be successful in obtaining the prize of 10,000 francs propounded by the French Geographical Society, for the task he has set himself.

The Italian Expedition into Central Africa.—A telegram from Gordon Pasha, dated Khartum, 23rd March, states that Messrs. Gessi and Matteucci, the Italian explorers, had passed through Fazoklu, the frontier Egyptian town, and had safely reached Fadasi, the first station in the Galla country, and the extreme point reached by Marno, the Austrian traveller. According to Gordon, the chief difficulties in the way of the Italians would be found between Fadasi and Kaffa, where, for thirty days' march, they would have to travel among hostile, savage, and cruel tribes. Gordon's intention is to establish military posts between these two stations, but it is beyond the power of Egyptian finances to bear the expense of maintenance just now. Gordon Pasha proposes to inspect the ports of Berberah, Zeyla, Massowah, and Suakin, and thence to return to Khartum, after which he will make for Darfur. He has promised to telegraph to Signor De Martino, at Cairo, any further intelligence respecting the Italian expedition.

A New Patagonian Volcano.—The United States' flag-ship 'Omaha,' in the morning of the 18th of last January, was in the channel which separates Wellington Island from the mainland, in Magellan's Strait. At 4.30 A.M. an immense cloud-like column of smoky vapour was seen to rise with great velocity to a height of several thousand feet. At 9.20 A.M. this phenomenon was repeated, and at 11.30 A.M., being opposite Libertad Bay, lat. 48° 55′ 30″ South, through a break in the high land bordering the channel, bearing east a little northerly, distant from 30 to 40 miles, a partly snow-covered peak, emitting vapour, was clearly seen, from which, judging from its position, the preceding eruptions must have taken place. This volcano does not appear to have been seen before. The name of the ship, 'Omaha,' is therefore proposed for it.

Colonel Prejevalsky is on his way home to St. Petersburg, having put off his projected expedition to Lhasa to a more favourable opportunity. We fear (though it is not so stated) that his recent illness must have incapacitated him from further exploration for the present. He appears to have profited by his stay at Zaissan by making some natural history collections.

The Late Mr. T. T. Cooper.—The death, by assassination, of Mr. T. T. Cooper, British resident at Bhamo, at the comparatively early age of 41, is a sad occurrence, though it is satisfactory to observe that it probably proceeded from no political motive such as must have prompted the murder of Mr. Margary. Mr. Cooper's chief reputation as a traveller rested on his remarkable journey up the Yang-tse-kiang across the province of Szechuen, and the frontier of Tibet to Bathang and thence to Wesi in Yunnan. His well-known work descriptive of this feat achieved a deserved popularity, and showed that he possessed in no small degree those necessary qualities of an explorer, courage, decision of character, and endurance. His next attempt to explore a route between India and China was made by way of Assam, but in this instance he was unable to get more than a few miles beyond the frontier. Had his life been spared geographical science would no doubt have been benefited by one who has been described by a high geographical authority as "one of the most adventurous travellers of our time."

Proceedings of Geographical Societies.

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THE ROYAL GEOGRAPHICAL SOCIETY.

Meeting of 13th May, 1878.

Sir RUTHERFORD ALCOCK, President, in the chair.

The paper of the evening was by Capt. H. TROTTER, R.E.

ON THE GEOGRAPHICAL RESULTS OF SIR T. D. FORSYTH'S MISSION TO KASHGAR IN 1873.

In introducing the author to the meeting, the PRESIDENT remarked that Captain Trotter had penetrated to those elevated regions north-west of Kashgar, of which previously very little was known. He had crossed mountain passes 15,000 to 20,000 feet above the sea level, and made accurate observations of the lofty plateau and passes of the Pamir, which in the imaginative language of the Persians was called the "Roof of the World."

In our number for September 1875, we published a most valuable paper by Captain Trotter on "Notes on Recent Explorations in Central Asia," in which he gave a summary of the principal geographical results of the Mission to Kashgaria under Sir Douglas Forsyth of which he was the geographer. Also in our number for November 1876, in our review of Sir Douglas Forsyth's Report of his Mission to Kashgar in 1873, we alluded to the important geographical observations and discoveries made by Captain Trotter; it is therefore unnecessary for us to now give an extended notice of the paper referred to.

In the course of his travels through the territories of the late Amir Yakub Beg Captain TROTTER stated that he had determined some unsettled questions with regard to the geography of the region, and had fixed the heights of the principal passes of the Pamir and Karakoram ranges. He doubted whether the Russians were better acquainted with the country on this side the frontier than we were, although within their own boundary they had of late carried on their explorations far more satisfactorily. One great task Captain Trotter had set himself was to determine the position of Lake Lob-nor, and everything was arranged for starting from Kashgar with this object in view, when at the last moment the Amir withdrew his permission for the expedition to proceed. This was a great disappointment to Captain Trotter, who had set his heart upon the exploration of this mysterious lake and of the surrounding country. This honour, however, has fallen to the Russians, Colonel Prejevalski having not only discovered the lake, but set at rest all doubts of the existence of the wild camel, by obtaining skins of these creatures, as detailed in our last number.

In the discussion which followed the reading of the paper the PRESIDENT remarked that the region which had been described was one of the most interesting in Central Asia, and that the recovery of Kashgar by the Chinese was a remarkable instance of the tenacity and perseverance with which they held on to any territory they had once possessed. A great many years ago, when the question of an alliance with Kashgar was under consideration, he (Sir Rutherford) expressed his conviction that the Chinese Government would never fail, sooner or later, to make such vigorous efforts as would probably recover the lost province. Yakub Beg had now passed away, and nearly the whole Mussulman population had been exterminated for the second time, which was the only way in which these Eastern races understood the conquest of a country. They had done the same in Yunnan and the South-Western Provinces, and, in fact, had carried on the practice for two thousand years, and, to all appearances, would continue to do so. The campaign, however, was a very strange one. Finding that their commissariat was insufficient, and that there was no food for them, the army from China turned their swords into ploughshares for a season and grew a crop of rice. Then they moved on again. This was a new mode of warfare. It required that time should be no object, and that there should be men in abundance. Although he did not suppose that the days of Yengis Khan or Timour would return, there was no doubt that the Chinese Government could send two or three million men across the whole breadth of the continent, if they chose to do so.

Sir DOUGLAS FORSYTH said he wished to add his mite of applause to that which had been given to his friend Captain Trotter, and to congratulate him on being the Gold Medallist for the year. When Lord Northbrook determined on sending the Mission to Kashgar, he decided not to leave the scientific results to haphazard, and therefore appointed two professional scientific men to take advantage of the opportunity to collect all the information they could regarding the interesting region to be passed through. One of these officers was Captain Trotter. He (Sir D. Forsyth) had witnessed the patience, endurance, and marvellous care with which he had pursued his investigations, and therefore he most heartily joined in congratulating him on having achieved such glorious results. Captain Trotter had been at an elevation of 19,000 feet, not only for one, but for several days, and had worked his instruments in a most laborious way. It might seem an extraordinary thing to people at home to learn that the cold was so intense in those parts, but from September till April the thermometer at night never rose above freezing-point, and for weeks together it was below zero. For the greater part of that time the Mission lived in tents. He recollected one morning, the cold being very severe, calling out to Captain Trotter, who was in the next tent, to know what the thermometer had registered during the night. The answer that came back was, "25° below zero." On one occasion Colonel Gordon, when out shooting, omitted to keep his gloves on, and on touching his rifle-barrel his hand became one mass of blisters. Captain Trotter, however, worked his instruments night and day with the utmost care, notwithstanding all the difficulties he had to contend with. Referring to the remark of the President of the Pamir being the "Roof of the World," as though it was the highest part, he had no doubt, that was the popular idea, but the Karakorum mountains were much higher: and while the passes over the Pamir were only from 13,000 to 14,000 feet, those over the Karakorum were from 19,000 to 20,000 feet. Until within the last fourteen or fifteen years the Chinese, who were masters of Yarkand and Kashgar, would not let any foreigner, European or Hindu, enter the country, which was therefore a sealed book, until the wave of Muhammadan rebellion, which began in the Western portion of China proper, spread towards Yarkand and Kashgar; and then Yakub Beg founded his kingdom. It was quite true that he established his power by a great deal of severity, but the result was that the most perfect peace reigned throughout the whole of his kingdom to such an extent, that bales of goods which unfortunate travellers had been compelled, by the loss of their ponies or camels, to leave on the road, remained untouched, as nobody would dare to meddle with them. The inhabitants too were all Muhammadans, but of a different type from what had lately been supposed to characterise Muhammadans. They were a simple, industrious, hospitable, friendly people. Wherever the English party went they were received with the utmost kindness. This must be put to the good account of the late Yakub Beg, who, however, was rather afraid of giving offence to the Russians, and therefore would not allow the Mission to carry out all the explorations that they had intended. Yakub Beg was assassinated about the middle of last year, and, in the anarchy

which followed, the Chinese general was able to push his troops forward, and to enter Kashgar. After slaughtering an immense number of people, he had now re-established the Chinese rule. He did not, however, think that all the male inhabitants had been killed. He hoped the Chinese would not fall back upon their old system of exclusion. By the Che-fu convention they had agreed to open many ports of the Empire, and perhaps they might be induced to allow the English to establish a Consulate at Yarkand. Setting aside these political considerations, he thought that a country which, within the last eight years had produced three or four Gold Medallists, must be one in which the Royal Geographical Society would feel considerable interest. He trusted that Sir Henry Rawlinson and the other members of the Indian Council who were connected with the Society would do their utmost to keep that region open for the benefit of future explorers.

In conclusion the PRESIDENT said the Council of the Society were perfectly unanimous in voting the Patron's Medal of the year to Captain Trotter as one who had richly earned any distinction which they had it in their power to confer. If the region which had been described was really the cradle of the race, it must be a very large cradle, for it had sent forth a very numerous progeny. He could not agree with Sir Douglas Forsyth in his estimate of the slaughter which had taken place by the Chinese in the territory formerly governed by Yakub Beg. He believed that they had, as nearly as might be, exterminated all the male inhabitants. They did the same thing in Yunan, and when he was in Canton 70,000 men were decapitated in one year in the execution grounds. Sir Douglas Forsyth had not touched upon the physical difficulties which the passes presented to commerce, but he was afraid that there was not much chance of ever establishing a large and lucrative trade by caravans between India and Kashgar. Still it was desirable, if possible, to have a friendly and continuous communication between the two countries, and no doubt this would have been secured by such diplomatists as Sir Douglas Forsyth, and such accomplished scientific explorers as Captain Trotter, but for the assassination of Yakub Beg and the destruction of the people over whom he had ruled.

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ITALIAN GEOGRAPHICAL SOCIETY.

March 10th, 1878.—Signor MALVANO, Vice-President, in the chair. The Baron F. VON HELLWALD read a paper on "Recent Discoveries in Central Asia," a term which he considered should, strictly speaking, be limited to the region between the Tian-Shan and the Himalayas, where the Russians and English had of late years shown such great activity in geographical exploration. Professor DALLA VEDOVA next read a paper on the history of exploration in the southern half of the continent of Africa down to the latest times.

March 19th, 1878.—Il Commendatore CORRENTI, President, in the chair. The PRESIDENT introduced Captain Martini, of the African Expedition, to the meeting, and gave an account of the progress of the expedition, and of the results brought home by the captain. These comprise a series of geological notes on the route between Shoa and the sea; a route survey, with notes, on the important mountain chain called Ittu, which is not to be found on Petermann's, Johnston's, or Cora's map; and a mass of ethnological, botanical, and other notes, scientific and general, on the country traversed by Signor Chiarini, the Marchese Antinori, and Captain Cecchi.

Captain MARTINI then gave a brief account of the difficulties encountered by the expedition, and exhibited two maps, one compiled by Captain Cecchi and the other by himself. They contain some points determined astronomically, and will be published, with the narratives, in the next issue of the *Memoirs*.

The latest intelligence regarding the progress of the Gessi-Matteucci expedition towards Shoa and the Galla country will be found in the Log Book of our present number.

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SPANISH GEOGRAPHICAL SOCIETY.

AT the end of 1877, and commencement of the present year, Don Francisco Coello was President of the Geographical Society of Madrid; and in all respects the progress of the institution has been satisfactory. The collection of maps and geographical books has been largely increased, and the number of Fellows is now 547. The *Boletín* for November 1877 contains the Address of the President on the progress of geographical work. Respecting the Spanish share of this work, Señor Coello announces that the geodetic operations in Spain itself are being steadily advanced towards completion, and several sheets of the atlas have been engraved. The *Boletín* contains a map of Spain showing the network of principal triangulations. On the 31st of December 1870 the Census of the Spanish peninsula and islands was completed, under the direction of the Geographical and Statistical Institute; and every precaution was taken to secure greater accuracy than was attained in 1860, the last time that a Spanish census was taken. The Report has now been issued. The population of Spain is 16,794,963, being an increase of a million since 1860. The Spanish Hydrographical Department has executed new work both in the Mediterranean and on the coasts of the Philippines, and charts have been completed of various anchorages in Mindanao and other islands. The Spanish Geological Survey has brought out the first part of the fourth volume of its *Boletín*, containing physico-geological descriptions of the provinces of Burgos, Logroño, Soria, and Guadalajara, with maps. Progress has also been made in the completion of a forest map of Spain, to illustrate the catalogues of trees and memoirs on State forests. The publication of fourteen new sheets, on a scale of $\frac{1}{400000}$, of the Map of Cuba is announced, completing twenty-eight published, while eight yet remain to finish the work. An important memoir on Puerto Rico, by Don Leonardo da Tejada, with a map, to show the roads and other means of locomotion, has also been finished; and a road map for the island of Luzon, one of the Philippines, has been completed by the Chief Engineer, Don Eduardo Lopez Navarro.

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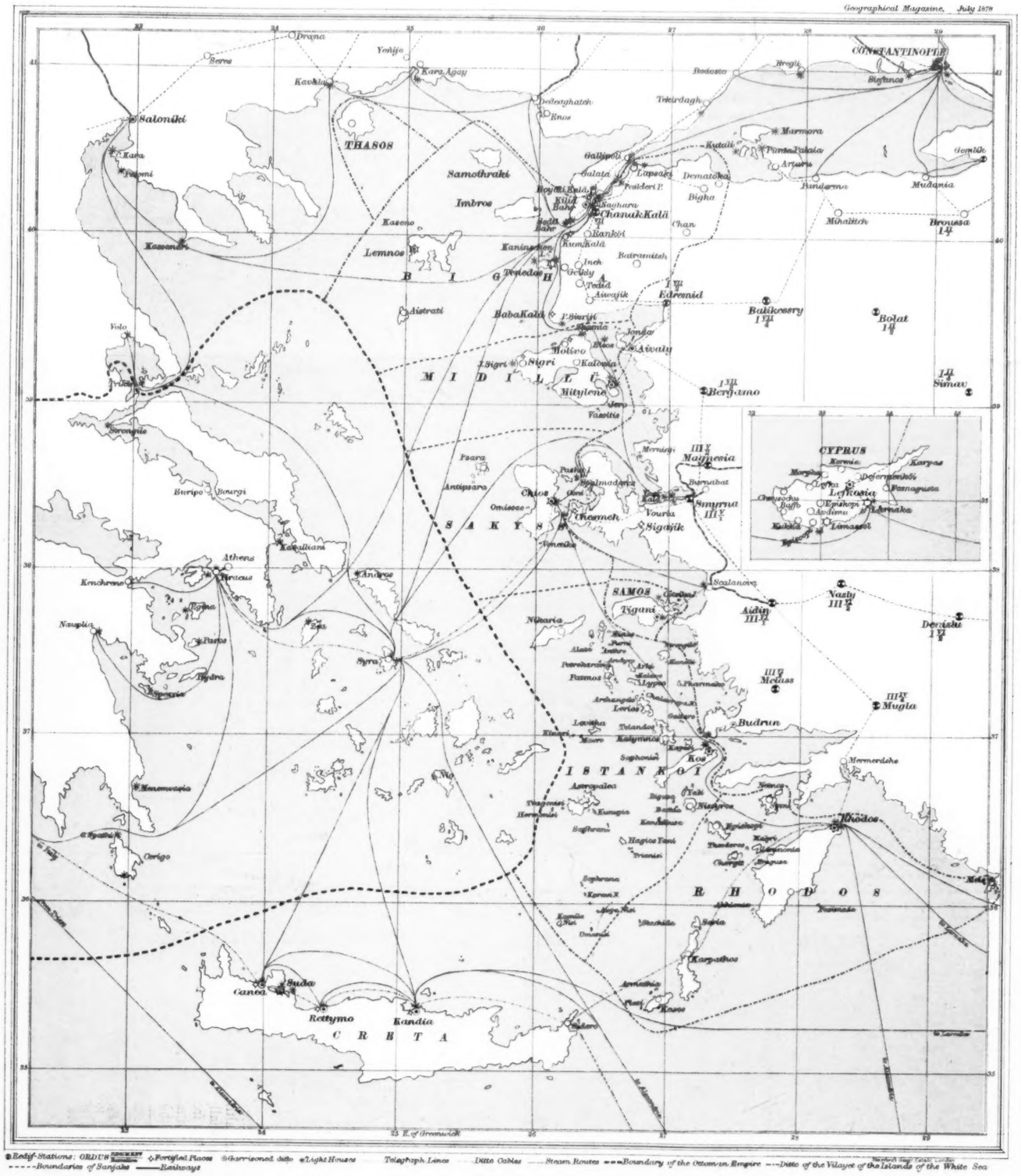
THE ADMINISTRATIVE DIVISIONS OF THE VILAYET OF THE ISLANDS OF THE WHITE SEA

Geographical Magazine. July 1878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